Response Styles of Structured Questions in Business Research

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Abstract – **In a scientific research work, a questionnaire is an important tool for collection of data from potential respondents. The most important part of a questionnaire is a question. The Questions are generally classified into two categories: Open ended questions and closed ended question. Open ended questions are called free response questions or unstructured questions and closed ended questions are called fixed response questions or structured questions. The main objective of this paper was to explore the response styles of structured questions. There is a range of measurement scales and response styles that are used during the development of a questionnaire. Different types of response styles of questions under nominal scale, ordinal scale, interval scale and ratio scales were discussed. Generally two types of nominal questions were found in different research tools i.e. dichotomous and multiple choice questions. Three types of ordinal questions: rank order question, rating scale question and constant cum question were discussed. Questions related to Interval scales and ration scales were also discussed. The fill in the blanks type response style was found in ratio scale questions. When developing a new research tool, it is important to clear which scale and response style to be used.**
Keywords : **Dichotomous question, Multiple choice question, Rank order question, Rating scale question, Interval scale questions and Ratio scale question.**

I. INTRODUCTION

A questionnaire is an important tool for collection of data from potential respondents under a research study. Data is collected by asking direct questions from respondents or asking them to agree or disagree with statements given in data collection tool. It is an indirect method of data collection in place of face to face interaction with the respondents. Questions are commonly classified into two categories: Open ended questions and closed ended question. Open ended questions are called free response questions or unstructured questions and closed ended questions are called fixed response questions or structured questions. Each form of questions has its advantages and limitations (Babbie, 2001: Neuman, 1997; Sudman and Bradburn, 1982). Table-1 summarizes advantages and limitations for the structured questions. The main drawback of fixed response questions is in the structuring of responses (Edwards, Thomas, Rosenfeld and Booth, 1997).There is a range of measurement scales and response styles that may be used during the development of a questionnaire. Different response styles produce different levels of data and influence the analysis part of the research study. Therefore, when developing a new research tool, it is important to clear which scale and response style to be used. The main objective of this paper is to explore the response styles of structured questions. Responses to structured questions are captured using one of the following response styles:

I. RESPONSE STYLES FOR NOMINAL SCALE QUESTIONS

The nominal scale questions have two or more options to answer. The aim of the nominal scale questions is to categorise the data. Generally two types of nominal questions are found in different research tools i.e. dichotomous and Multiple choice questions. If a respondent is asked to select one of two possible answers, such as true/false, yes/no, or agree/disagree is called the dichotomous question**.** The layout of dichotomous questions is given in table-1. The dichotomous question is useful because it forces potential respondents to put the fence on an issue. It collects a clear response. Further, quick coding of the responses is possible because of being only two categories of response. A dichotomous question is also used as a sorting tool for subsequent questions.Sudman and Bradburn (1982) suggest that if dichotomous questions are being used, then it is desirable to use several to gain data on the same topic, in order to reduce the problems of respondents' 'guessing' answers. Youngman (1984) suggests that it is a natural human tendency to agree with a statement rather than to disagree with it; this suggests that a simple dichotomous question might build in respondent bias. Indeed, people may be more reluctant to agree with a negative statement than to disagree with a positive question (Weems, Onwugbuzie, Lustig 2002). Sometime requiring a yes/no answer from respondents may be inappropriate. It might be more appropriate to have one more option of answer i.e. don't know option.In addition to dichotomous questions, a researcher may require to collect informations regarding dichotomous variables. A variable having two values, for example sex (male/female) , background (rural/urban) and marital status (married/unmarried) are called dichotomous variables. In such cases respondents have to select one of the two responses. The example of dichotomous variables is given in table-1.

TABLE 1 DICHOTOMOUS: QUESTIONS AND THEIR RESPONSE STYLE

Answer the following questions	
Dichotomous Items (Type-1)	**Responses**
1. Are you a marketing executive?	Yes/No
2. Facebook is a social networking site.	True/False
3. Honesty is the best policy.	Agree/Disagree
Dichotomous Items (Type-2)	**Responses**
1. Gender	Male/Female
2. Background	Urban/Rural
3. Category	General/Reserve

One more type of nominal question is multiple choice questions in which more than two unordered options are given. Multiple choice questions categorize the data into more than two categories. These categories must not have any overlapping and being mutually exclusive. A proper guidance has to be given at the completion of the multiple choice questions. It must be clear that respondents have to tick only one option (a single answer mode) or any number of options (multiple answer mode) from the given options for the answer. Data collected through multiple choice questions can be coded and aggregated to give a summary of responses. It is an appropriate and useful instrument for the research. The layout of a multiple choice questions is given in table-2.Like dichotomous questions have dichotomous variables in their parallel, multiple choice questions have multiple elements of a variable in their parallel. The multiple choice question "Which class a student belongs?" is the example of multiple elements of a variable. There may be more than 20 classes in a school but respondents have to select only class. The nominal data can be processed using the chi-square statistic, the binomial test, the G-test and cross-tabulations (Cohen and Holliday, 1996).

TABLE 2 MULTIPLE CHOICE: QUESTIONS AND THEIR RESPONSE STYLE

Please answer the following questions				
Multiple Choice Items	**Responses**			
	A	B	C	D
1.What is your experience?	1-5 Years	6-10 Years	11-15 Years	16+ Years
2.How do you take tea?	Black	With milk	With lemon	With other
3.What colour is the sky?	Red	Orange	Blue	Purple
4.What is the capital of India?	Delhi	Lucknow	Jaipur	Bhopal
5.What is luxury item?	TV	Car	Bus	A Cruise

II. RESPONSE STYLES FOR ORDINAL SCALE QUESTIONS

An ordinal scale question refers to the question in which two or more than two ordered options are given to answer.
The main objective of the ordinal question is to collect ordinal data from potential respondents. Ordinal scales generally measure non-numeric concepts like satisfaction, happiness, stress & spirituality etc. There are three types of ordinal questions: rank order question, rating scale question and constant cum question. The rank order question seems like multiple choice question but one addition to this type of question is that the respondents are asked to answer on the basis of their priorities among the available choices. In a rank order question, a list of items is given and the respondent is required to place them in a rank order of their choice (see table-3).

Please rank order the following online stores in order of your preference to shop at these stores.Give 1 for highest priority, 2 for the second highest priority and so on.Continue this procedure until you have ranked all the stores in order of preference.No two online stores should receive the same rank number.

TABLE 3 RANK ORDER: QUESTIONS AND THEIR RESPONSE STYLE

Rank order Items	Rank
1. Amazon	
2. Jabong	
3. Myntra	
4. Flipkart	
5. Snapdeal	
6. Paytm	
7. Shopclues	
8. Home Shop18	

Eight items are listed in table-3. This might be difficult for the respondents to make fine distinctions among eight items. Respondents might not be able to differentiate their responses and do not feel strong enough to make such distinctions. The use of too long list might be overwhelming. Wilson and McLean (1996) suggest that it is unrealistic to ask respondents to arrange priorities where there are more than five ranks that have been requested. In the case of the list of eight items (table-4), the researcher might deal this problem in one of the two ways. The first way is to reduce the items to five items, where respondent fairly catches the items what he feels. The second way is the list of the items can be retained as it is, but the respondents can be requested only to rank their first five priorities. Rankings are useful in indicating *degrees* of response. Therefore, in this context, they are like rating scales.

One way in which degrees of response, intensity of response and the move away from dichotomous questions have been managed can be seen in the notion of rating scales*.* A rating scale yields "a *single score* that indicates both the direction and intensity of a person's attitude" (Henerson, Morris, and Fitz-Gibbon, 1978). Because the scoring method for most rating scales is based on the idea of measuring the intensity, hardness, or potency of a variable (Dwyer, 1993; Neuman, 1997), each item must differentiate those respondents with a favorable attitude from those with an unfavorable attitude. There are several measurement techniques that have been used to assess beliefs, attitudes, and intentions (Fishbein and Ajzen, 1975). However, four major rating scales are commonly used in a questionnaire development are Likert scales, semantic differential scales, Thurstone scales and Guttman scales. These scales use fixed choice response formats and are designed to measure attitudes or opinions (Bowling,1997,Burns & Grove,1997).These are very useful devices for the researcher, as they build in a degree of sensitivity and differentiation of response while still generating numbers. A Likert scale (named after its divisor, Rensis Likert 1932) provides a range of responses to a given question. The layout of the Likert scale questionnaire is given in table-4.

TABLE 4 LIKERT SCALE:QUESTIONS AND THEIR RESPONSE STYLE

Answer the following questions					
Likert scale Items	**Responses**				
The workshop was	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Relevant					
2. Useful					
3. Informative					
4. Satisfactory					
5. Well organised					

These two examples, both indicate an important feature of an attitude scaling instrument, namely the assumption of unidimensionality in the scale; the scale should be measured only one thing at a time (Oppenheim 1992).It is a very straightforward matter to convert a dichotomous question into a multiple choice question. For example, instead of asking the 'do you?', 'have you?', 'are you?', 'can you?' type questions in a dichotomous format, a simple addition to wording will convert it into a much more subtle rating scale, by substituting the words 'to what extent?', 'how far?', 'how much?', 'how often?' etc. A semantic differential is a variation of a rating scale which operates by putting an adjective at one end of a scale and its opposite on the other. The layout of the questionnaire of semantic differential is given in table-5.Osgood (1952), the pioneers of this technique, suggest that semantic differential scales are useful in three contexts: evaluative (e.g. valuable-valueless, useful-useless, good-bad); potency (e.g. large-small, weak-strong, light-heavy); and activity (e.g. quick-slow; active-passive, dynamic-lethargic).

TABLE-5 SEMATIC DIFFERENTIAL SCALE:QUESTIONS AND THEIR RESPONSE STYLE

How would you rate our Prime Minister-Narendra Modi?						
	Strongly Agree	**Agree**	**Neutral**	**Agree**	**Strongly Agree**	
Honest						Dishonest
Strong						Week
Motivated						Aimless
Energetic						Lazy
Wise						Foolish

The assumption of equal intervals does not exist between the categories of ordinal scale. It is very clear that a rating at point 4 never represents that it is twice the rating of point 2.A researcher cannot infer that the intensity of feeling in the Likert scale between strongly agree and agree is same as between strongly disagree and disagree. The problem of equal intervals has been addressed in Thurstone scales (Oppenheim 1992). The use of rating scales is more in social research because they provide more opportunities than nominal questions for collecting more sensitive data. The rating scales are very useful for collecting data with reference to attitudes, perceptions and opinions. A pilot study is a necessary part of the ordinal data collection because it is needed to devise and refine categories, making them exhaustive and discrete.

The Thurstone scale is made up of statements about a particular issue and each statement has a numerical value indicating the repondent's attitude about the issue, either favorable or unfavorable. People indicate which of the statements with which they agree and the average response is computed. The thurstone technique starts with a set of belief statements regarding a specific issue. A researcher can construct an attitude scale from a longer collection of attitude statements. Next, these statements are classified into one to eleven categories from most favorable to neutral and from neutral to least favorable. This is done through a judgment procedure of subject-matter experts (Miller, 1991).Further; the researcher computes a mean or median rating and assigns the value to the statement. Statements are discarded if the assignment of the statement is variable across experts. The Thurstone scale is then developed by selecting statements with a scale value evenly spread from one extreme to the other, that is, 1 to 11 (Edwards, Thomas, Rosenfeld, and Booth-Kewley, 1997; Miller, 1991). An example of a Thurstone scale question is shown in table-6. Thurstone scaling approximates an interval level of measurement (Miller, 1991). Developing a true Thurstone scale is considerably more difficult than describing one (Nunnally, 1978). Nevertheless, economy and effectiveness of data reduction, if adequately developed and scored, are its strengths. The method is not often used by analysts and evaluators today because of the labor intensiveness of the dimension-construction process and the need for a large number of content experts to do the item rating and sorting (Babbie, 2001;Edwards, Thomas, Rosenfeld, and Booth-Kewley, 1997).

TABLE 6 THURSTON SCALE:QUESTIONS AND THEIR RESPONSE STYLE

Answer for the following questions.		
Thurston Scale Items		Responses
The workshop was	Weigtage	Agree/Disagree
1. Relevant	5.5	
2. Useful	1.3	
3. Informative	2.8	
4. Satisfactory	10.7	
5. Well organised	7.3	

Guttman scale is a type of one dimensional scaling method established by Louis Guttman in 1944.This scaling is also known as Cumulative Scaling or scalogram analysis.Guttman scaling is widely used in the measurement of attitudes and public opinion. This scale mostly involves the dichotomous scale with the answers like Yes or no, agrees or disagrees etc. It is also possible to use a Likert scale, although this is less commonly used.The statements provided in this scale specifically increases with the explanation of the same statements in specificity. It allows progressive investigation into the nature of interview probing, such that you can find out to what degree respondents agree with a concept. The group of questions seeks to investigate just one trait. This scaling involves the concept of immigration. For instance, a scale designed to measure attitudes toward immigrants might ask people to indicate whether or not they would be accepting of immigrants as (a) citizens in the country, (b) coworkers in the same company, (c) neighbors, (d) close friends, and (e) close relatives by marriage. A tolerant individual would probably endorse each one of these statements in the scale. A less tolerant individual might be willing to accept immigrants as citizens in the country, but not as neighbors or close family members. Thus, knowing that a person is not willing to accept immigrants as neighbors allows us to infer that this person probably would not want immigrants as close friends either; accepting them as family members would be even less likely for this person. By knowing the last statement endorsed by a respondent, one can easily reproduce his pattern of responding to the rest of the statements. An example of a Guttman scale question is shown in table-7.

TABLE 7 GUTTMAN SCALE:QUESTIONS AND THEIR RESPONSE STYLE

Answer for the following questions on an X-criminal		
Guttman Scale Items	Yes	No
Level:1. I would like X-criminal as a coworker.		
Level:2. I would like X-criminal as a neighbor.		
Level:3. I would like X-criminal as a close friend.		
Level:4. I would like X-criminal as a servant.		
Level:5. I would like X-criminal as a life partner.		

III. RESPONSE STYLES FOR INTERVAL SCALE QUESTIONS

Interval scales measure numerical variables where a true zero does not exist. In this numerical scale we know the order of values as well as the exact differences between the values. The meaning of interval is space in between which is an important point to remind-interval scales not only tell about order of values but also about the difference between each value. Celsius temperature is the classical example of interval scales because we can put the temperature values in order as well as the difference between each value is same. For example, the difference between 70 and 60 degrees is a measurement of 10 degrees temperature and same is the difference between 90 and 100 degrees of temperature. One more example of interval scale is time where we can put the values in order and each value of time has exact same difference. Interval scale data is good for the starting of statistical analysis. Measures of central tendency and measures of dispersion can be calculated from interval scale data. An example of an interval scale question is given in table-8.

The main limitation of the interval scale is that it does not have a "true zero" and without a true zero, we cannot do ratio calculations. Interval data can add and subtract, but cannot multiply or divide. For example, there is no such thing as 'no temperature' when it comes to the Celsius scale. If we add 20 degrees and 20 degrees, we get 40 degrees. If we subtract 10 degrees from 20 degrees, we get 10 degrees. In such type of calculation, there is no problem. If we divide 40 degrees by 10 degrees or multiply 40 degrees to 10 degrees, there is problem, because of the absence of true zero on Celsius scale. It is acceptable to treat scores from this type of response format as interval data to allow the use of common parametric tests (Ferguson& Cox 1993, Polar & Thomas 1995). For base line calculations, interval scale is good, but we cannot calculate ratios, which takes us to our last measurement scale i.e. ratio scale.

TABLE 8 INTERVAL SCALE : QUESTIONS AND THEIR RESPONSE STYLE

Answer the following questions					
Interval Scale Items (Numerical Format)					
The Pizza supplied by Dominos is					
1. Fresh	5	4	3	2	1
2. Tastes Good	5	4	3	2	1
3. Value for Money	5	4	3	2	1
Interval Scale Items (Semantic Format)					
The Pizza supplied by Dominos is					
1. Fresh	Excellent	Very Good	Good	Poor	Worst
2. Tastes Good					
3. Value for Money					

IV.RESPONSE STYLES FOR RATIO SCALE QUESTIONS

Ratio scales measure numerical variables where a true zero exists. Examples of such variables are age, monthly salary, weight and height etc.The fill in the blanks type response style is used in ratio scale question. The respondent puts in a numerical value as the answer. The accuracy of the answer is much higher than in other scales of measurement. The layout of the ratio scale question is given in table-9.
Ratio scale data provide a greater possibility of statistical analysis. All the four basic operations (addition, substraction, multiplication and division) of mathematics can be applied successfully on ratio scale data. Central tendency, measures of dispersion and coefficient of variation can also be calculated from ratio scales. One more response style of ratio scaling is where the respondent has to award marks out of, say, ten, for a particular statement. This is a device that has been used in business and commerce for measuring service quality and customer satisfaction, and is being used in education (Kgaile and Morrison, 2006). This kind of questionnaire layout is mostly used in telephonic survey interviews because it is very easy to understand for the respondents.

TABLE 9RATIO SCALE (TYPE1): QUESTIONS AND THEIR RESPONSE STYLE

Answer the following questions	
Ratio Scale Items	**Answers**
1. What is your age?	
2. What is your monthly salary?	
3. What is your weight?	
4. What is your height?	
5. What is the length of your table?	

The argument could be advanced that this is a sophisticated form of rating scale, but the terminology used in the instruction clearly suggests that it asks for ratio scale data. The layout of this ratio scale question is given in table-10.

TABLE 10 RATIO SCALE (TYPE2): QUESTIONS AND THEIR RESPONSE STYLE

	Please give a mark from 1 to 10 for the following statements, with 10 being excellent and 1 being very poor.	Very Poor to Excellent									
S.No	**Ratio Scale Items**	1	2	3	4	5	6	7	8	9	10
1	The company provides Salary according to the Work.										
2	The company recognize and acknowledge your work.										
3	Welfare facilities provided to the employees.										
4	Physical working condition in the Company.										
5	Employees get Appreciation and rewards.										

V. CONCLUSION

The paper explored the response styles of structured questions used in a research tool. Different response styles of nominal scale questions, ordinal scale questions, interval scale questions and ratio scale questions were discussed. Two main response styles of nominal questions: dichotomous and multiple choice questions are very much used in business research. Three response styles of ordinal questions: rank order questions, rating scale questions and constant cum questions are used to measure an attitude, perception or opinion of the respondents. Questions related to interval scales and ratio scales were also discussed. The fill in the blanks type response style was found in ratio scale questions. It is concluded that when developing a new research tool, it is important to clear which scale and response style to be used. The paper will be very useful for researchers who are interested in developing a new research tool for their research work.

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