Testing the List Order Response Effect Among Respondents With Cognitive Sophistication: Experimental Evidence in Management Information Systems Research

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Abstract: Questionnaires constitute a valuable data-collection tool in Management Information Systems (MIS) research. However, MIS researchers have identified various biases in the design and implementation of questionnaires. This paper focuses on the bias resulting from the order of items in the answer choices, called list order bias. Such bias is described through a framework of cognitive theories, including the cognitive elaboration model, memory limitation hypothesis, and satisficing theory. Previous literature has proved that satisficing theory is superior in explaining list order bias; therefore, such theory is adopted for this study. Satisficing theory posits that respondents provide a satisfactory rather than an optimal answer when a survey question requires cognitive effort. Previous research has shown that satisficing is triggered by respondents' cognitive abilities to complete the questionnaire and, therefore, it is predominant among less educated respondents. However, the extent to which satisficing behaviors could occur, even among respondents with higher education and cognitive abilities, still needs to be ascertained. This is particularly important for MIS studies that investigate information systems' adoption at the organizational level because they rely mostly on respondents who are information technology (IT) managers. Therefore, this study adopts the satisficing theory to examine the list order response effect among cognitively sophisticated respondents in the MIS field. The authors selected and manipulated a question from the Society for Information Management's (SIM) IT Trends Study web-based questionnaire to conduct such an analysis. The SIM IT Trends Study survey questions offer a lengthy list of answer options to SIM members who are IT managers inside organizations that operate in various business sectors. The authors created two types of the same list question: one provided the list options in alphabetical order and the other provided the list answers in reverse-alphabetical order. The findings show statistically significant empirical evidence for list order bias by revealing that, despite their cognitive sophistication, respondents were more likely to choose the first available answer, especially in the case of reverse-alphabetical order. In light of these findings, the authors propose remedies to decrease the satisficing behaviors of such respondents. In particular, researchers could break questions with long lists into several questions with short lists and then combine those responses into the answer selection list of a final question. Researchers could also provide the answer selection lists to half of the sample alphabetically and the other half in reverse order and then combine the two subsamples into the final possible responses. Alternatively, researchers could use "trigger" or "priming" statements before displaying the question and its answer selection list to reduce the questionnaire's difficulty. In summary, this study addresses the list order response bias among respondents with cognitive sophistication in MIS research, explains why this bias occurs by employing satisficing theory, and provides remedies for reducing the relevant occurrence. Hence, this manuscript contributes to MIS research by providing insights to improve the quality of questionnaires by minimizing satisficing behaviors that lead to list order bias, and it makes MIS practitioners aware of the possible influence of question design when they respond to questionnaires.

Keywords: Answer selection list, List order bias, Order effect, Question and questionnaire design, Satisficing theory

1. Introduction

Questionnaires are a well-established means of data collection for conducting empirical research as a method of scientific inquiry in many fields, such as sociology, social psychology, education, political science (Giddeon,

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2012), and management information systems (MIS) (Olszak, 2016). Therefore, the design and quality of questionnaires are crucial to the reliability of questionnaire results in such fields. Question formats defined as "closed-ended" provide relevant response categories (Lavrakas, 2008), and some can even offer a list of items as responses to reduce time and response fatigue (Dashen et al., 2001). Because of these advantages, MIS studies have extensively used "closed-ended" questions with an answer selection list of items (Curry and Stancich, 2020; Taskin, Verville, and Keskin, 2014; Galup, Gary, and Jiang, 2008; Choudrie and Dwivedi, 2005), primarily to conduct research that investigates phenomena at the organizational level. For example, "closed-ended" questions were used to study the role of firm size in the adoption of enterprise information systems (Trigo et al., 2015). Also, the Society for Information Management's (SIM) IT Trends Study has relied, since its inception in 1980, on "closed-ended" questions to investigate the major information technology (IT) trends and issues in the market (Kappelman et al., 2014). However, the order of the answer options in answer selection lists can influence respondents to choose a specific answer based on its position in the list, leading to the so-called ordering response bias (Bhattacherjee, 2012).

Previous methodological studies have analyzed ordering response bias by drawing mostly on satisficing theory (Revilla and Couper, 2017; Roberts et al., 2019). Specifically, satisficing theory posits that "when optimally answering a survey question would require substantial cognitive effort, some respondents simply provide a satisfactory answer instead" (Krosnick, 1991, p.213). In the case of survey questions with a list of response alternatives, many respondents will select the first response alternative that they consider reasonable or acceptable. For example, respondents may select a response alternative presented early in the list, and, in this case, the respondents' satisficing behavior leads to the so-called "primacy effect." Alternatively, respondents may select a response alternative presented later in the list, and, in this case, the respondents' satisficing behavior leads to the so-called "recency effect."

Previous research has shown that satisficing is predominant among less educated respondents (Holbrook et al., 2007; Krosnick et al., 2002), but several studies have also considered satisficing and its influence on surveys in relation to the length of response alternatives and response scales among respondents who are university students (Oppenheimer, Meyvis, and Davidenko, 2009), members of various panels (Bishop and Smith, 2001; Robmann Gummer, and Silber, 2017), and respondents recruited through crowdfunding platforms (Paas and Morren, 2018).

However, there is a lack of research investigating the existence of satisficing behaviors among highly cognitively sophisticated respondents. This investigation is particularly important for MIS studies because they mostly examine information systems' adoption at the organizational level and rely extensively on respondents who are information technology (IT) practitioners with a high level of cognitive sophistication. Cognitive sophistication is the collection of abilities that individuals use to retrieve information from their memory and integrate this information into expressed decisions (Krosnick, 1991). More specifically, indicators of cognitive sophistication are respondents' level of education, number of years of education, cognitive skills, and age (Roberts et al., 2019). Satisficing is triggered by the respondents' cognitive abilities to complete the survey, and, therefore, it is expected to occur among respondents with low cognitive sophistication (Krosnick, 1991). However, suppose it could be shown that satisficing occurs even among respondents with high cognitive sophistication. In that case, researchers should consider other issues, such as the difficulty of the questionnaire and motivation to complete it. Therefore, researchers should develop strategies that address the above issues rather than simply focus on the respondents' abilities. Using an alphabetical or a reverse alphabetical list could be one of those strategies because it could decrease the questionnaire's difficulty, by minimizing the respondents' fatigue in evaluating response alternatives.

Overall, because previous studies have shown that list order effects such as primacy and recency effects can be the result of satisficing behaviors that are mostly applicable to long answer selection lists among respondents without cognitive sophistication (Krosnick, 1991; Smyth et al., 1987) and it was confirmed that task difficulty increases these behaviors (Krosnick, 1991), this study investigates the following research problems: (i) the quality of the survey instrument undermined by list order bias in case of long answer selection lists provided to respondents with high cognitive sophistication because their satisficing behaviors and (ii) the use of an alphabetical or reverse alphabetical list as an effective way to reduce those satisficing behaviors. More specifically, this study addresses the following research questions:

RQ1: *Does the length of selection lists trigger ordering bias because of satisficing behaviors among respondents with high cognitive sophistication?*

RQ2: *Does an alphabetical or a reverse-alphabetical list effectively reduce satisficing behaviors?*

To answer the above questions, the authors carried out an experiment on the web-based questionnaire conducted among the Society for Information Management (SIM) members, who are IT practitioners. The authors selected a question from the questionnaire of the Society for Information Management's (SIM) IT Trends Study that provides a lengthy list of answer options (Kappelman et al., 2014). Moreover, to effectively test the existence and the severity of the list order effect and to investigate possible methods to reduce it, the authors created two different types of the same list question: one list provided the answer options in alphabetical order, and the other list provided the answer options in reverse-alphabetical order. The authors randomly assigned participants to one version or the other. The findings from this experiment show a significant response bias resulting from the order of the answer options presented to the respondents. These findings can be generalized and employed across different disciplines and among different respondents with cognitive sophistication; therefore, in light of these findings , the authors investigate possible methods to decrease the satisficing effects.

This paper is unique in (i) explaining list order bias among respondents with high cognitive abilities and as a function of the list length by employing satisficing theory and (ii) assessing whether using an alphabetical list or a reverse alphabetical list can be an effective method to reduce satisficing.

This paper's main theoretical contribution is to understand whether cognitively sophisticated respondents exhibit satisficing behaviors and which strategies should be adopted to mitigate the effects of these behaviors. Indeed, the design and quality of questionnaires are crucial to preserve and guarantee the reliability of questionnaire results in the MIS field and the rigor of business research (Andrieux et al., 2024). Therefore, the importance of this study relies on analyzing how to minimize the effects of satisficing among respondents with high cognitive abilities, to increase the rigorousness of the survey instrument. The remainder of this paper is organized as follows: Section 2 reviews relevant prior literature and develops our hypothesis, Section 3 reports our data collection methodology, Section 4 analyzes the relevant results, Section 5 discusses such results, and Section 6 provides recommendations to improve questionnaire design to mitigate list order bias and offers suggestions for future research.

2. Literature Review and Hypothesis

Previous studies focusing on research methodologies showed that questionnaire-based survey methods are used more than other research methods in the MIS field (Grover et al., 1993). However, the popularity and the increasing use of this methodology has led to studies that investigate factors affecting the “quality” of the survey instrument (Alwin, 1989; Sivo et al., 2006; King et al., 2007; Hamby, et al., 2016) Specifically, recent MIS research has investigated possible factors that may undermine the accuracy of the responses: subconscious evaluations that influence respondents unconsciously, called "implicit attitude" (Serenko and Turel, 2019; Serenko and Turel, 2020; Serenko, 2022), or desirable or undesirable behaviors that distort respondents' self-reporting, called "social desirability bias" (Kwak, Ma, and Kim, 2021; Kwak Holtkamp, and Kim, 2019). Previous MIS studies have also proposed possible remedies and techniques to measure and control the effects of the above factors on questionnaire results, such as mixed-mode surveys or a multi-methods approach (Serenko, 2022; Serenko and Turel, 2019; Serenko and Turel, 2020; Kwak, Ma, and Kim, 2021; Kwak Holtkamp, and Kim, 2019).

However, the quality of questionnaires can also be undermined by order biases (Malhotra, 2008; Balkan and Kholod, 2015). Order biases occur when the respondents’ answers are affected by, for example, the sequence of questions (Perreault Jr., 1975; Khorramdel, Kubinger, and Uitz, 2014), the number of answer categories (Asensio and Revilla, 2022), the scale direction (Höhne and Krebs, 2018), and the order in which a list of multiple responses is provided (Mathews, 1929; Hensley, 2000). Previous studies have attempted to propose possible solutions to overcome the response order bias that arises from questions with a list of possible answers. For example, Mathews (1929) suggested that individuals answer those questions using "a word or symbol" rather than being provided with a list of printed items. More recently, MIS research has employed methodological research tools such as the "Delphi method," which consists of an iterative process that collects responses from experts using questionnaires and feedback from the facilitators to reach convergence on a topic. Although the iterative nature of this method provides improvements to "traditional" survey methods (Okoli and Pawlowski, 2004; Parè et al., 2013), the "Delphi method" has raised methodological rigor issues related, for example, to its complexity and the lack of clarity in MIS research (Reeb, 2023; Alarabiat and Ramos, 2019). Other studies have proposed using shorter answer lists with only five or ten answer options (Couper, 2008; Dillman, 2014; Callegaro, Manfreda, and Vehovar, 2015). Although such a solution could be ideal, it is not always practical because answer options need to be exhaustive. In other words, shorter answer lists could not render meaningful insights possible in studies that need to capture the complexity of business realities. Indeed, business studies, particularly MIS

research, have extensively relied over the years on questions with various list alternatives to investigate phenomena related to technology adoption issues at the organizational level, as shown in Table 1.

Table 1: MIS Studies Surveys with Response List Alternatives

MIS Study	Number of Response List Alternatives
Caudle, Gorr, and Newcomer 1991	37
Leitheiser, 1992	54
Thong, 1999	8
Gholami et al., 2013	8
Trigo et al., 2015	12
Kappelman et al., 2019	41
Palvia et al., 2021	14

In an attempt to provide further solutions to the list order effect, previous studies have developed several approaches to explain the relevant causes: the memory limitations hypothesis (Smith, 1994), the cognitive elaboration model (Schwarz, Hippler, and Noelle-Neumann, 1992; Malhotra, 2008), and satisficing theory (Krosnick, 1991), as described below.

2.1 Cognitive Elaboration Model

The cognitive elaboration model considers three factors leading to response order bias: "the serial position, the presentation mode, and the plausibility of response categories" (Höhne and Lenzner, 2015, p.364). The serial position refers to the display of the response alternatives at the beginning, middle, or end of a list; the presentation mode refers to the format of the questionnaire, i.e., auditory, face-to-face, or visual; the plausibility of response categories refers to response alternatives that elicit agreeable or disagreeable thoughts (Bishop and Smith, 2001).

Given the combination of those three factors, the cognitive elaboration model predicts (i) primacy effects in a visual presentation format and in an auditory format where the response alternatives at the end are implausible and (ii) recency effects in an auditory presentation format and in a visual presentation format where the response alternatives at the beginning are implausible.

However, the cognitive elaboration model does not explain if and how primacy effects and recency effects can depend on factors such as "memory limitations, the complexity of response categories, and the cognitive ability and motivation of respondents" (Bishop and Smith, 2001, p.482). For example, the cognitive elaboration model cannot explain the occurrence of primacy and recency effects related to the behaviors of respondents who choose specific items from the top or the bottom of the list because of the difficulty of retrieving information from memory among the answer options or the difficulty of comparing all the different items and making a judgment among them.

2.2 Memory Limitations Hypothesis

The memory limitation hypothesis posits that response list order bias occurs because respondents cannot remember all the response alternatives. Specifically, respondents select subsequent response options rather than initial ones due to short-term memory and, therefore, recency effects occur. Recency effects are particularly expected when questions are in an auditory format without visual aids, such as phone surveys. This is because when the interviewer reads response alternatives, respondents will mostly remember the last options and select one of them.

However, a drawback of the memory limitation hypothesis is the inability to explain primacy effects because these effects depend on long-term memory, while the memory limitation hypothesis considers effects that are only dependent on short-term memory (Bishop and Smith, 2001). In other words, employing the memory limitations hypothesis makes the cause of primacy effects unclear. It does not explain why items at the beginning of a list and stored in long-term memory are sometimes more easily selected with respect to items at the end of the list and stored in short-term memory. Therefore, only recency effects play a significant role in the memory limitations hypothesis because this approach can only explain the response behavior of selecting among the last-mentioned response options.

2.3 Satisficing Theory

Satisficing theory explains order response bias by claiming that such bias occurs because of the satisficing behaviors of the respondents (Krosnick, Narayan, and Smith, 1996). These behaviors described in the work of Krosnick, Narayan, and Smith (1996) as "weak satisficing," consist of selecting the "first satisfactory or acceptable response alternative" (Bishop and Smith, 2001, p.483) rather than choosing the optimal response. An answer is considered optimal when it is provided through "four stages of cognitive processing": interpretation of the question, searching memories, integration of information into judgments, and reporting such judgments clearly and precisely (Krosnick, 1991). Specifically, Krosnick, Narayan, and Smith (1996) posit that in the case of response alternatives to closed-ended questions presented in a visual format, primacy effects are likely to occur because the fatigue in evaluating the above alternatives will lead respondents to select those presented early in the list. However, in the case of response alternatives to closed-ended questions presented in an auditory format, recency effects are more likely to occur because respondents do not have the opportunity to recall the earlier alternatives fully (Krosnick, Narayan, and Smith, 1996). Overall, the factors that foster satisficing are identified as the task's difficulty, respondents' ability, and respondents' motivation to perform the task. Because satisficing theory considers all the above factors together, it can provide better insights, with respect to the cognitive elaboration model and the memory limitation hypothesis, into when respondents will choose a response strategy that does not lead to the optimal answer but just to a satisfactory answer.

Table 2 presents a framework to summarize the peculiarities of each approach and shows that satisficing theory is superior in explaining list order bias. Indeed, previous studies have mostly used satisficing theory to evaluate the quality of survey data. Specifically, the recent systematic review of English journal articles analyzed by Roberts et al. (2019) from 1987 to 2015 shows that methodologist studies have drawn primarily on satisficing theory to assess list order response bias (Roberts et al., 2019).

Table 2: Framework of Cognitive Theories

Theory	Assumption	Primacy and Recency Effects	Effect/Bias
Satisficing Theory (Krosnick, 1991)	The difficulty of the task, respondents' cognitive abilities, and their motivation lead to weak satisfaction, i.e., providing rapid answers without fully understanding them. Weak satisficing leads to a primacy effect, i.e., the selection of answer options at the beginning of an answer list, or to a recency effect, i.e., the selection of answer options at the end of an answer list.	Both primacy and recency effects are explained. Task difficulty, respondent ability, and respondent motivation are the causes of primacy and recency effects.	Satisficing leads to response order effects that make questionnaire responses order-dependent.
Cognitive Elaboration Model **(Schwarz, Hippler, and Noelle-Neumann, 1992)**	Primacy effects are predicted in visual presentation format. Recency effects are predicted in auditory presentation format.	Both primacy and recency effects are explained. Primacy and recency effects depend on the serial position, the presentation mode, and the plausibility of response categories.	The position of a response item and the presentation format lead to response order effects.
Memory limitation hypothesis **(Smith, 1994)**	Respondents are not able to remember all responses - alternatives.	Only recency effects are explained. Recency effects are dependent on short-term memory.	Memory limitations generate response order effects.

Following satisficing theory's assumptions, the authors believe that response effects such as primacy and recency effects result from satisficing behaviors that mainly occur with long answer selection lists. This reasoning

is confirmed by prior studies, which show that shorter surveys decrease satisficing (Krosnick, 1991). In other words, a positive relationship exists between the length of a survey and satisficing (Galesic and Bosnjak, 2009; Gibson and Bowling, 2019; Schmidt, Gummer, and Rossmann, 2020) because long surveys reduce respondents' motivation (Herzog and Bachman, 1981). While researchers speculated about the possible cognitive burdens stemming from the order of answer selection items in questionnaires, no literature empirically investigated this type of bias among respondents who belong to professional associations. Previous studies examined satisficing effects among respondents who are university students (Oppenheimer, Meyvis, and Davidenko, 2009), members of specific panels, such as the Gallup Panel that selects households (Bishop and Smith, 2001), the panel of the Respondi AG that selects the German electorate (Robmann Gummer, and Silber, 2017), and respondents with and without a higher education degree (Terentev and Maloshonok,2019) or recruited through crowdfunding platforms, such as SmartSurvey and MTurk (Paas and Morren, 2018). However, further research is needed to examine satisficing behaviors among respondents with cognitive sophistication because business research, including MIS, relies on such respondents. Indeed, most MIS studies examine technology adoption issues at the organizational level and respondents are mainly IT managers.

Therefore, this research investigates satisficing behaviors among respondents with cognitive sophistication, i.e., individuals with cognitive abilities to contribute meaningfully to problem-solving and decision-making processes, such as those IT practitioners who are members of a professional association such as SIM. Indeed, suppose list order response bias caused by satisficing also occurs in the case of respondents who should have cognitive sophistication. In that case, other issues are also likely, such as task difficulty and motivation to perform the task. Therefore, researchers should focus on proposing strategies to address the above issues rather than focusing on respondents' abilities. In this respect, scholars (e.g., Krosnick and Alwin, 1987; Schuman and Presser,1981) have confirmed that minor or seemingly trivial alterations of the questions' framing and/or context could significantly affect the results of questionnaire-based studies. However, previous literature did not explicitly investigate the difference in the degree of such effects among alternative versions of the same question. The authors conducted such an investigation by modifying a question in the SIM IT Trends Study and using an alphabetical versus a reverse-alphabetical order answer option list. The authors selected the question on the "most important or worrisome IT management issues" in the SIM questionnaire that contains a long list of answer options. This SIM's survey question was used to address this study's research questions (**RQ1** and **RQ2**) by first investigating the relationship between the questionnaire responses with answer selection lists and the length of the available answer options. Given that previous studies have shown that the number of answer categories triggers order bias (Asensio and Revilla, 2022), the authors examine if this finding can be explained by the existence of satisficing behaviors. Then, because previous literature confirmed that task difficulty increases these behaviors (Krosnick, 1991), the authors investigate if alphabetical or reverse-alphabetical order represents a method to reduce them. Therefore, the authors formulate the following null and alternative research hypotheses:

> ***Ho:*** *The length of the answer selection list in alphabetical versus reverse-alphabetical order does not lead to satisficing behaviors and does not affect responses about the most important or worrisome IT management issues.*
>
> ***Ha:*** *The length of the answer selection list in alphabetical versus reverse-alphabetical order leads to satisficing behaviors and affects responses about the most important or worrisome IT management issues.*

3. Methodology

Data was collected among the members of the Society for Information Management's (SIM) through a random sampling technique. SIM is an American professional organization composed of senior IT employees of organizations, companies, or divisions of larger organizations who pay to be members. SIM organizations are mostly based in the United States, operate in various business sectors, and have revenues ranging from $5 million to $100 million. Each SIM member was provided one copy of the questionnaire of the SIM IT Trends Study to complete the sponsored survey (Kappelman et al., 2014). The authors distributed 4,612 questionnaire requests, and 1,002 were returned, leading to a response rate of 21.4%. Since its inception in 1980, the SIM study has been a collaboration of academics and practitioners to investigate the practices, concerns, and demographics of senior IT leaders and their organizations (Ball and Harris, 1982). Specifically, the authors use the questionnaire and data from the SIM IT Trends Study because it is highly regarded and cited among MIS scholars. Indeed, given that it has been published since 1980 in one of the leading MIS journals, MISQ Executive, it has proven to be a well-validated instrument. Moreover, its research rigor is well documented in the study's Appendix, "Research Methods, Design," which explains the study's research methodology. To test the research

hypotheses, the authors modified the "most important or worrisome IT management issues" question. This question has been part of the SIM study since its inception, and it asks respondents to "pick up to three" answers from the list of 40 answer options (see Appendix A for the complete list). The authors selected such a question with a lengthy list of answer options because it is more likely to trigger the list order response bias (Asensio and Revilla, 2022). The authors modified the "most important or worrisome IT management issues" question by creating two versions: one with the answer items in alphabetical order (as shown in Appendix A) and the other with the answer items in reverse alphabetical order. Participants were randomly assigned to one version or the other. In all, 717 respondents answered the "most important or worrisome IT management issues" question: 360 using the alphabetical order list and 357 using the reverse alphabetical list. Each respondent is a senior-level IT professional member of the Society for Information Management (SIM) and a senior IT employee from a different organization.

4. Analysis and Findings

The authors conducted a Kolmogorov-Smirnov Goodness-of-Fit Test (Lilliefors,1969) carried out with SPSS (Statistical Program in Social Sciences) to check the normal distribution of the study's sample. The data did not fit a normal distribution because the authors found a significance *(p)* of less than 0.05 and, therefore, they rejected the assumption of normality. Since the Kolmogorov–Smirnov test showed the sample is not normally distributed ($p < 0.05$), the authors used the non-parametric Chi-square test for homogeneity. The Chi-square non-parametric test was used because the authors were concerned to obtain a goodness of fit of the responses to a uniform distribution, for which the Chi-square is the appropriate test (Conover, 1999). This tests whether the responses of the two groups, alphabetical and reverse-alphabetical, share the same distribution across the list of answer options. For analysis purposes, the authors ordered alphabetically the reverse-alphabetical group's responses, and they divided the 40 answer options from both lists into four identical quadrants of 10 items each (as shown in Appendix B). The division into four quadrants allows for examining the effect of items at the front or end of the list versus the larger middle 50%. This approach looks at the location of items in groups and provides better information about location than examining the distribution of the individual items. Table 3 shows the observed frequencies and expected frequencies for the alphabetical and reverse-alphabetical groups. Multiplying the total number of selections in each quadrant by the percentage of the 2051 total number of items selected by the respondents in each group (i.e., 50.463% alphabetical, 49.537% reverse-alphabetical) provides the expected cell frequencies.

Table 3: Observed and Expected Item Selection Frequencies

Item Quadrant	Respondent Group				Total
	Alphabetical		Reverse-Alphabetical		
	N = 360		N = 357		
	Observed	Expected	**Observed**	Expected	
1 (Alignment to Enterprise Architecture)	**324**	(259.4)	**190**	(254.6)	514
2 (Global IT to IT Disaster Recovery)	**207**	(174.6)	**139**	(171.3)	346
3 (IT Efficiency to IT Value Proposition)	**266**	(294.2)	**317**	(288.8)	583
4 (Knowledge Mgmt. to Vendor Mgmt.)	**238**	(306.8)	**370**	(301.2)	608
Total	**1035**		**1016**		2051

The calculated $X2$ is 81.24 with three degrees of freedom and a p-value of less than 0.0000 (1.66 e-17). Since the p-value is less than the 0.05, or 0.01 critical value, the authors infer that the null hypothesis is likely false and that the answer selection list order matters. Notice that although the authors assigned the same number of participants to each group, 19 (or 1.87%), more respondents in the group that had the answer options list ordered alphabetically completed the question. On average, each respondent in the alphabetical group selected 2.875 items, while the reverse-alphabetical respondents selected 2.846 items, about 1% less. Both these findings suggest the possible effect of the likely increased cognitive burden for the reverse-alphabetical group. More importantly, the authors observed an uneven distribution of item selections between the two groups across the four quadrants. In both groups, respondents selected more items in the first quadrant presented. In the alphabetical group, more items were selected from the beginning of the alphabetical list (Quadrant 1). Similarly,

the reverse-alphabetical group selected more items from the beginning of the reverse-alphabetical list (Quadrant 4), as shown in Table 3 and Figure 1.

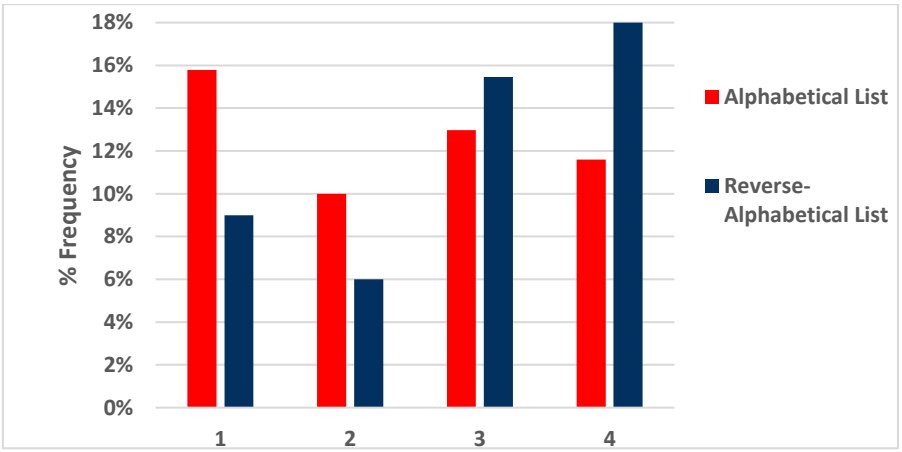

Figure 1: Alphabetical and Reverse-Alphabetical Item Selections by Quadrant

The number of selections in each quadrant varied based on the presentation of the options in alphabetical or reverse-alphabetical order. When the list was presented in alphabetical order, the respondents appeared to favor those items listed early, and they chose 324 options from Quadrant 1, while the respondents who were provided the reverse-alphabetical order chose only 190 from Quadrant 1. Further evidence of the list order influence is observed by examining the responses in Quadrant 4, where the respondents who received the reverse-alphabetical order list chose 370 items, while the group that received the alphabetical list chose only 238 items from Quadrant 4. Overall, the alphabetical group selected 531 items from the first two quadrants (or 51.3% of the 1035 answer items they selected), while the reverse-alphabetical group selected 687 items from the last two quadrants (or 67.6% of the 1016 answer items they selected). Table 4 shows that post-hoc examination of the Chi-square analysis supports these findings as it indicates that the largest deviations from a uniform distribution occurred in Quadrants 1 and 4. The positive standardized residual in the alphabetical respondent group's Quadrant 1 (3.262, p-value = 0.001) indicates that the actual selection frequency is significantly greater than the expected selection frequency ($\alpha = 0.05$).

By contrast, the negative standardized residual (-3.323, p-value = 0.001) in Quadrant 1 for the reverse-alphabetical respondent group indicates an actual selection frequency significantly lower than expected ($\alpha = 0.05$). Similarly, the positive standardized residual (3.358, p-value = 0.001) in Quadrant 4 of the reverse-alphabetical respondent group indicates an actual selection frequency significantly greater than the expected selection frequency ($\alpha = 0.05$). The negative standardized residual (-3.297, p-value = 0.001) in Quadrant 4 of the alphabetical respondent group indicates that the actual selection frequency is significantly lower than expected ($\alpha = 0.05$).

Table 4: Standardized Residuals for Alphabetical and Reverse-Alphabetical Respondents

Item Quadrant	Respondent Groups	
	Alphabetical	Reverse-Alphabetical
1 (Alignment to Enterprise Architecture)	3.262	-3.232
2 (Global IT to IT Disaster Recovery)	1.893	-1.928
3 (IT Efficiency to IT Value Proposition)	-1.368	1.393
4 (Knowledge Mgmt. to Vendor Mgmt.)	-3.297	3.358

When the order of the list was alphabetical, the top five items selected by the respondents as "the most important or worrisome IT management issues" all came from the first thirteen items of the list (i.e., from the first and second quadrants and the first 32.5% of the 40-item list), specifically from "Alignment" to "Innovation." When the order of the items was reversed, five of the top six items selected by the respondents as most important or worrisome came from the first 12 items presented (i.e., from the third and fourth quadrants and the first 30% of the 40-item reverse–alphabetical list), specifically from "Velocity of Change in Business" to "IT Time-to-Market." Among the top 10 items identified by each of the two groups of respondents, only six are in

both groups' responses, and they are in the opposite ranked order. Overall, there is strong empirical evidence that the length of the answer selection list in alphabetical versus reverse-alphabetical order leads to satisficing behaviors. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

5. Discussion

Our findings confirm that respondents choose answers from the top of a list rather than searching the entire list for the most appropriate or "best" selection(s). The study's results are consistent with the findings of previous literature, which has shown the existence of a positive relationship between lengthy surveys and satisficing (Galesic and Bosnjak, 2009; Gibson and Bowling, 2019; Schmidt, Gummer, and Rossmann, 2020). In other words, increasing a survey's length by displaying a long list of answer items can lead to satisficing behaviors. Therefore, the results appear consistent with the satisficing effect as theorized by Krosnick (1991). When responding to a question requires substantial cognitive effort, as in this study in which respondents were asked to select up to three answers from a list of 40 items, many respondents simply provide a satisfactory answer rather than an optimal answer to reduce their effort (Krosnick, 1991).

Moreover, the modification of the survey questions utilized in our research (i.e., alphabetical versus reverse-alphabetical order of the answer list) and the analyses presented here suggest that the "satisficing" effect on respondents is somewhat more prominent in the reverse-alphabetical group. In other words, displaying the response alternatives in alphabetical order can mitigate satisficing behaviors by decreasing the mental fatigue of respondents in reading the answer options. As a result, presenting response alternatives in alphabetical order can be considered an efficient mechanism to reduce satisficing behaviors compared with a reverse-alphabetical order presentation. This reasoning is supported by previous satisficing studies, which have demonstrated that reducing the task's difficulty through survey questions that are less cognitively demanding can minimize satisficing behaviors (Krosnick, 1991; Blazek and Siegel, 2023).

Overall, the findings in this research make a new contribution because they show that (i) the length of the list of items in a questionnaire plays a significant role in the answers selected by the respondents because they are likely to engage in "satisficing" when the list is long, (ii) satisficing behaviors are more prominent when answer selection lists are in reverse alphabetical order, and (iii) respondents belonging to professional associations such as SIM take satisficing behaviors in spite of their high level of cognitive sophistication to answer survey questions.

Despite such a contribution, this study has several limitations. First, the sample is composed of IT practitioners who are members of a professional association based in the U.S., and a replication of the experiment among different practitioners who belong to professional associations located in other countries has not been performed by the authors. Second, the SIM IT Trends Study is conducted through an online survey; therefore, our findings could not be applicable in the case of telephone or face-to-face surveys. Third, the authors could not assign respondents to specific devices, for example, smartphones versus personal computers; therefore the authors did not investigate whether the type of device used could affect the results.

6. Recommendations and Future Research

There are significant theoretical and methodological implications for this study's results, which can be applied among respondents with cognitive sophistication beyond the MIS discipline. From a theoretical point of view, the authors believe that because satisficing behaviors still occur in the case of an answer selection list in alphabetical list order among respondents with advanced cognitive abilities, researchers should attempt to reduce the effects of the other conditions that foster satisficing, such as the difficulty of the questionnaire and respondents' motivation to complete the questionnaire.

From a methodological point of view, the findings stress that when practitioners and academics want to use questionnaire-based results as input for their decision-making, question design parameters such as answer selection list length and list order, i.e., reverse-alphabetical versus alphabetical, should be considered more carefully. Most importantly, researchers who value questionnaires as a tool for research are advised to design their questionnaires with extra care and a keen awareness of the possible response biases in order to limit potential bias effects as much as possible and to receive the fullest potential benefit from questionnaire-based research.

Also, when practitioners respond to questionnaires, they need to be aware of the possible influence of question design, cognitive load or burden, and satisficing behavior. This awareness is critical to providing "optimal" answers rather than "satisfactory" answers and avoiding possible response biases, especially to questions requiring substantial cognitive effort. A lack of response biases is particularly important, for example, for the

business community. Indeed, research questions addressed by business scholars tend to focus on issues that have implications and are of primary importance for practitioners, particularly chief information officers (CIOs). Future studies may, for example, investigate research topics based on the answers provided by CIOs to question 40 of the SIM IT Trends Study, which asks about the "most important or worrisome IT management issues." The risk is that the influence of the response order effect on the CIOs' answers to the above question, as shown in this research, may guide future studies to focus on research topics that do not accurately reflect issues of primary importance to IT managers.

Several mechanisms are available to address the list order bias issues identified in this study. The use of short lists in alphabetical order is ideal. Indeed, shorter lists in alphabetical order decrease the mental fatigue of respondents and encourage them not to simply choose the first satisfactory items on the list. Unfortunately, these options are often not possible. When researchers cannot use shorter lists in alphabetical order, the authors suggest breaking questions with long lists into several questions with short lists and then combining those responses into the answer selection list of a final question. For example, it is possible to divide the 40 items used in this research into four or five questions of eight or ten options each, allow two or three selections in each sub-question, and then combine those responses in a concluding question from which to choose the final answers. Because our analysis shows that the alphabetical group selected more items from the beginning of the alphabetical list (Quadrant 1) and, similarly, the reverse-alphabetical group selected more items from the beginning of the reverse-alphabetical list (Quadrant 4), the 40 items appear to present an issue that could be mitigated by dividing the list into shorter subsets. Such subdivision is best accomplished if rational subgroups are possible. This approach should be used carefully and according to the circumstances. It is practical in shorter questionnaires with few questions or where respondents are required to spend the time needed to complete the questionnaire. However, such a multi-part question will likely require considerable time in longer questionnaires. Finally, a multi-part question may reduce the accuracy of responses if, for example, a respondent's three best answers are all in one of the sub-questions but only two can be selected from each sub-question. Other viable suggestions include the following:

- Providing the answer selection lists to half of the sample in alphabetical and the other half in reverse-alphabetical order, and then combining the two subsamples in a final set of results that would lead to a mix of alphabetical and reverse-alphabetical items at the top, in the middle, or at the bottom of the list (Heyman and Sailors, 2016). This was the approach used in the 2014 SIM IT Trends Study (Kappelman et al., 2014), whereby both alphabetical and reverse-alphabetical versions of potentially problematic questions (i.e., those with long lists of options from which to choose answers) were used and then combined into the final possible responses.
- Using "trigger" or "priming" statements before displaying the actual question and its answer selection list. For example, with the "most important or worrisome IT management issues" question used in our research, a statement such as "before proceeding to the next question, please take a moment to think about your organization's most important or worrisome IT management issues" could be beneficial . Using a priming statement could reduce the possible effects of list order response biases by minimizing the task's difficulty and increasing respondents' motivation to complete the questionnaire.

Overall, this research provides insights into the optimal design of questions and survey instruments. The role of list length, the interaction of list length and order, and the number of selections required and/or allowed are worthy of future investigation. Specifically, future research is necessary to reduce response bias by manipulating the above parameters and survey design to reduce satisficing behaviors.

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Appendix A: Question no. 40

"Most important or worrisome IT management issues" with questionnaire list of IT management concerns/issues in alphabetical order In each column, please select up to three (3) concerns or issues.

1. Alignment
2. Business Cost Reduction Controls
3. Business Agility/Flexibility
4. Business Continuity
5. Business Process Management
6. Business Productivity
7. Bring Your Own Device (BYOD)
8. CIO Leadership
9. Compliance and Regulations
10. Enterprise/IT Architecture
11. Globalization of IT
12. Infrastructure Capability
13. Innovation
14. Insourcing of Previously Outsourced IT
15. Integration
16. IT Agility
17. IT Change Management
18. IT Cost Reduction
19. IT Credibility
20. IT Disaster Recovery
21. IT Efficiency
22. IT Governance
23. IT Operations/ITIL/IT Service Delivery
24. IT Organization Design / Structure
25. IT Performance Measures
26. IT Reliability / Quality / Availability
27. IT Strategic Planning
28. IT Talent / Skill Shortage / Human Resource

29. IT Time-to-Market
30. IT Value Proposition in the Business
31. Knowledge Management
32. Prioritization Process for IT Projects
33. Project Management
34. Revenue Generating IT Projects
35. Risk Management
36. Security/Privacy
37. Shadow IT / Rogue IT
38. Velocity of Change in Business
39. Velocity of Change in IT
40. Vendor Management

Appendix B: Questionnaire List of IT Management Concerns/Issues in Quadrants for Analysis

Group 1	**Group 3**
1. Alignment	21. IT Efficiency
2. Business Cost Reduction Controls	22. IT Governance
3. Business Agility/Flexibility	23. IT Operations/ITIL/IT Service Delivery
4. Business Continuity	24. IT Organization Design / Structure
5. Business Process Management	25. IT Performance Measures
6. Business Productivity	26. IT Reliability / Quality / Availability
7. Bring Your Own Device (BYOD)	27. IT Strategic Planning
8. CIO Leadership	28. IT Talent/Skill Shortage/Human Resource
9. Compliance and Regulations	29. IT Time-to-Market
10. Enterprise/IT Architecture	30. IT Value Proposition in the Business
Group 2	**Group 4**
11. Globalization of IT	31. Knowledge Management
12. Infrastructure Capability	32. Prioritization Process for IT Projects
13. Innovation	33. Project Management
14. Insourcing of Previously Outsourced IT	34. Revenue Generating IT Projects
15. Integration	35. Risk Management
16. IT Agility	36. Security/Privacy
17. IT Change Management	37. Shadow IT / Rogue IT
18. IT Cost Reduction	38. Velocity of Change in Business
19. IT Credibility	39. Velocity of Change in IT
20. IT Disaster Recovery	40. Vendor Management