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Questions in a Research Setting

Because closed-ended (multiple-choice) questioning formats are often used in educational research, it is important to understand how presenting response options can affect the data obtained. In this study children and adults answered questions in an open-ended condition or one of two closed-ended conditions where options were either likely or unlikely. Participants who were presented with unlikely response options generated their own responses more often than participants who were presented with likely response options. On the other hand, children were more likely than adults to choose the presented response options regardless of how unlikely they were. These findings have important research implications; response options for closed-ended data collection devices must be selected carefully to reflect real-world possibilities.

Étant donné que l'on emploie souvent des questionnaires sous forme de questions fermées (à choix multiples) dans la recherche en éducation, il est important de comprendre comment la présentation du choix de réponses peut influencer les données ainsi obtenues. Les enfants et les adultes qui ont participé à cette étude ont répondu soit à des questions ouvertes, soit à des questions fermées où les choix de réponses étaient probables ou improbables. Les participants à qui on avait présenté des choix de réponses improbables ont produit leurs propres réponses plus souvent que ceux à qui on avait présenté des choix de réponses probables. Par ailleurs, les enfants étaient plus portés que les adultes à choisir les réponses proposées, indépendamment de leur improbabilité. Ces résultats ont des implications importantes pour la recherche: dans la collecte de données, il est important de bien formuler les choix de réponses aux questions fermées pour qu'ils constituent des possibilités réalistes.

Questionnaires are increasingly being used in educational research. They are relatively simple and efficient to administer and score, and they allow for standardized data collection. As with any data collection device, however, questionnaires have the potential to provide misleading, incomplete, or even incorrect information about the research questions for which they were designed.

Schwarz (1996) reviewed a large number of questionnaire studies and concluded that the range of presented response alternatives in questionnaires can greatly influence the data that are obtained. For example, Schwarz, Hippler, Deutsch, and Strack (1985) found that the range of response categories provided in a closed-ended (multiple-choice) question format influenced both the

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behavioral reports obtained and their subsequent judgments. Participants in one condition reported their daily use of television on a scale that ranged from up to 30 minutes to more than two and a half hours, whereas those in another condition used a rating scale that ranged from up to two and a half hours to more than four and a half hours. Participants in the second condition reported a higher use of television and estimated a higher average use of television than the participants in the first condition. Schwarz et al. (1985) argued that the participants used the presented response alternatives to estimate the average amount of television viewed and subsequently placed their own television-viewing behavior within this framework.

Schwarz's (1996; Schwarz et al., 1985) research reinforces the idea that participants use presented response alternatives to interpret the meaning of a question. Consequently, questions that are worded in an identical manner may be interpreted by research participants in different ways because different response options are presented to them. The range of presented responses can influence the results that are obtained because participants may assume that the responses reflect the researcher's assumptions about the distribution of behavior in the general population. Hence participants may use the information provided to estimate their own behavior in a way that is socially desirable in relation to the behavior of the general population.

In contrast to the vast quantity of research that has been conducted with adults, little research has been done with child populations. Exploring the impact that presented response alternatives has on children is important. After all, in the research setting children are often placed in a new situation in which they must interact with a stranger (Powell & Vacha-Haase, 1994). Without the security of having a parent by their side, children may become nervous and/or apprehensive. Thus when authority figures present response options to children in the experimental procedure, children may be more likely to choose a presented option because they think these are the responses that the researcher would like to hear.

Developmental differences may also play a role in how children respond to response options. For instance, Powell and colleagues (Powell, 1968; Powell & Isbister, 1974; Powell & Shklov, 1992) suggested that a developmental reasoning hierarchy exists. By examining the mistakes that children and adults made in response to multiple-choice tests, these researchers found that when children could not retrieve a specific answer from memory, they employed different thinking strategies to select an answer. What thinking strategy a child uses depends on his or her age. For instance, Powell and Shklov (1992) found that 10-year-old children used the literal meaning of a phrase, whereas 12-year-old children used the figurative meaning. To explore the possibility that children and adults are differentially affected by response options, we tested both adults and children.

In addition to the need for more research exploring the influence of both qualitatively different response options and developmental differences, more research is also needed to compare the responses from open-ended and closed-ended questions. There was a huge controversy over the use of open-ended and closed-ended questions in the 1930s and 1940s. In more recent years, however, comparisons of open-ended and closed-ended questions have often

been based on common sense rather than on support from existing research in this area (Schuman & Presser, 1981). Thus research directly comparing the results obtained from open-ended and closed-ended questions is needed.

The goals of this study were to explore how the likelihood of response options affects children and university students, as well as whether the mere presence of response options influences reporting by children and university students. Children in grade 3 were selected because they are capable of reporting on their behavior (Siegler, 1991) but may be young enough to be influenced by the experimental setting. This research is important because researchers are beginning to rely more on standardized procedures and closed-ended methods for efficiently collecting large amounts of information from research participants. Questionnaires are being used to collect interest, attitude, and self-reported behavior information from children, adolescents, and adults in many different areas ranging from informal classroom interest surveys and multiple-choice tests to published research reports (Macmillan, Liu, & Timmons, 1997; McEwen, 1998).

Our experimental task involved immediate retrospective reporting of spelling strategies. We had participants spell words and then report their spelling strategies in one of three conditions. In the open-ended condition participants derived their own spelling strategies in order to answer the question "How did you know how to spell the word that way?" In two closed-ended conditions the participants were asked the same question and then were presented with a series of response options. In the likely condition participants were presented with likely spelling strategy options, whereas in the unlikely condition participants were presented with unlikely spelling strategies. The participants in the closed-ended conditions were also given the option to generate their own answer. This latter option was provided so that none of the participants was forced to choose any particular response, thus allowing for a comparison of the responses to all three conditions.

We chose a spelling task that has been extensively investigated (Steffler, Varnhagen, Boechler, Friesen, & Taylor, 1997; Steffler, Varnhagen, Friesen, & Treiman, 1998). As well, we used nonword stimuli (e.g., *smag*) to ensure that all the participants had similar exposure to the words regardless of their differing experiences with words and/or their age. The use of nonwords also allowed participants to use a wider diversity of spelling strategies. Because the participants usually were not able to retrieve the words from memory directly, they had to use spelling strategies such as sounding out the words or comparing them to other words that they were familiar with. We used the strategy reports from Steffler et al. (1997) to develop the response options for the two closed-ended conditions. Drawing specific spelling strategies from preestablished categories allowed us to ensure that response options presented in the closed-ended conditions were matched on all dimensions except for likeliness.

Method

Participants
The participants were 60 grade 3 children and 66 introductory psychology students. All the participants were native English speakers.

Table 1
An Example of the Likely and Unlikely Options for the Word *smag*

Option	Strategy	Condition Likely	Unlikely
"a"	Direct retrieval	I knew the word *smag*	I knew the word *smag* because it is a game that I used to play when I was younger
"b"	Analogy	It sounded like the word *smog* with an "a" instead of the "o"	It sounded like the word *mag* with an "s" in front of it
"c"	Segmentation	I sounded it out like "sm - ag"	I sounded it out like "sma-mag"
"d"	Generated	I spelled it another way: Participant provides another strategy	I spelled it another way: Participant provides another strategy

Materials

The spelling test consisted of 32 four-letter nonwords (e.g., *smag, dasp*) used by Steffler et al. (1997). Table 1 shows the options provided in the likely and unlikely conditions for the example *smag*. In all cases, option "a" represented direct retrieval, option "b" an analogy strategy, option "c" a segmentation strategy, and option "d" an open-ended option in which the participant could express some other strategy used. The likely condition options were constructed from the commonly reported strategies in Steffler et al. (1997). The unlikely condition options were not observed by Steffler et al. and were also constructed to represent inconsistent strategies. For example, the unlikely segmentation option written for *smag* included repetition of parts of the nonword. Similarly, the analogy option makes reference to a "word" that is really a nonword.

Procedure

Participants were tested individually and were informed that they could leave the experiment at any point in time.

Two practice trials identical to the experimental trials allowed the participants to become familiar with the task. The participant listened to a word, heard it in the context of a sentence, listened to the word again (e.g., "smag. The little smag rolled down the hill. smag."). The participant then typed the word on a computer. After spelling each word, the participant was probed for the spelling strategy used.

In the two closed-ended conditions, the participant was presented orally with a series of spelling strategies in the standard multiple-choice format. The participant was instructed to choose one of the options or generate a strategy for the word. In the likely condition the participant selected an answer from a series of likely spelling strategies or described another strategy; in the unlikely condition the participant chose from a presented series of unlikely spelling strategies or described a technique that was not already presented as an option. In the open-ended condition the participant was merely prompted to report his or her spelling strategy.

Coding

To determine whether the likeliness of the presented options influenced responding, only the data from the closed-ended conditions were used. For this analysis the frequency with which options "a," "b," "c," and "d" were chosen was calculated for each participant and the mean frequency of each option was calculated for each group and condition.

To determine whether specific spelling strategies were influenced by the presence of response options, data from the three conditions were coded according to spelling strategy categories. Most of the data could be coded as direct retrieval, analogy, or segmentation. Overall, few responses did not fit into one of these three categories; these were not included in the analysis. Two researchers independently coded the data, and the overall reliability of the coding was 99.4%. The frequency of each strategy category was determined for each participant and mean frequency for each category was determined for each group and condition.

Results

To address our question of whether the likelihood of response options influences participants' responses, we analyzed frequency of responses to the four options with a two between-subjects (Group and Condition) by one within-subject (Option) repeated measures analysis of variance (ANOVA). There was a main effect of Option, $F(3, 240)=56.99$, $p<.05$. According to Tukey's honestly significant difference (HSD) post hoc analyses, option "d" (generated strategy: $M=15.9$, $SD=10.3$) was chosen most often, followed by option "c" (segmentation: $M=10.0$, $SD=9.4$), option "b" (analogy: $M=4.9$, $SD=5.1$), and option "a" (direct retrieval: $M=1.1$, $SD=3.5$) was chosen least often, $HSD=2.16$, $p<.05$.

Option interacted with Condition, $F(3, 240)=21.18$, $p<.05$, and with Group, $F(3, 240)=3.44$, $p<.05$. Participants in the likely condition ($M=13.9$, $SD=9.7$) selected option "c" (segmentation) more often than participants in the unlikely condition ($M=6.0$, $SD=7.3$); conversely, participants in the unlikely condition ($M=21.1$, $SD=9.4$) selected option "d" (generated strategy) more often than participants in the likely condition ($M=10.5$, $SD=8.2$), $HSD=4.42$, $p<.05$. Similarly, regardless of what condition they were in, adults ($M=18.0$, $SD=10.1$) selected option "d" more often than children ($M=13.6$, $SD=10.1$), $HSD=4.42$, $p<.05$.

The three-way interaction between Group, Option, and Condition, $F(3, 240)=2.79$, $p<.05$, is shown in Figure 1. Adults and children did not differ in terms of responding to the likely options, but they did differ in how they chose the unlikely options. As shown in Figure 1, adults in the unlikely response condition were statistically significantly more likely to choose option "d" (generated strategy) than children, $HSD=7.07$, $p<.05$. These results demonstrate a differential effect of the likelihood of options on responding by child and adult participants in an experimental setting; children are more willing to accept one of the presented options even if it is an unlikely option.

To address our question of whether the mere presence of options can influence responding, we analyzed general strategy responses from the three experimental conditions with a two between-subjects (Group and Condition) by one within-subject (Option) repeated measures ANOVA. There was a main effect of Strategy, $F(2, 240)=84.59$, $p<0.05$; overall, analogy ($M=15.8$, $SD=9.8$)
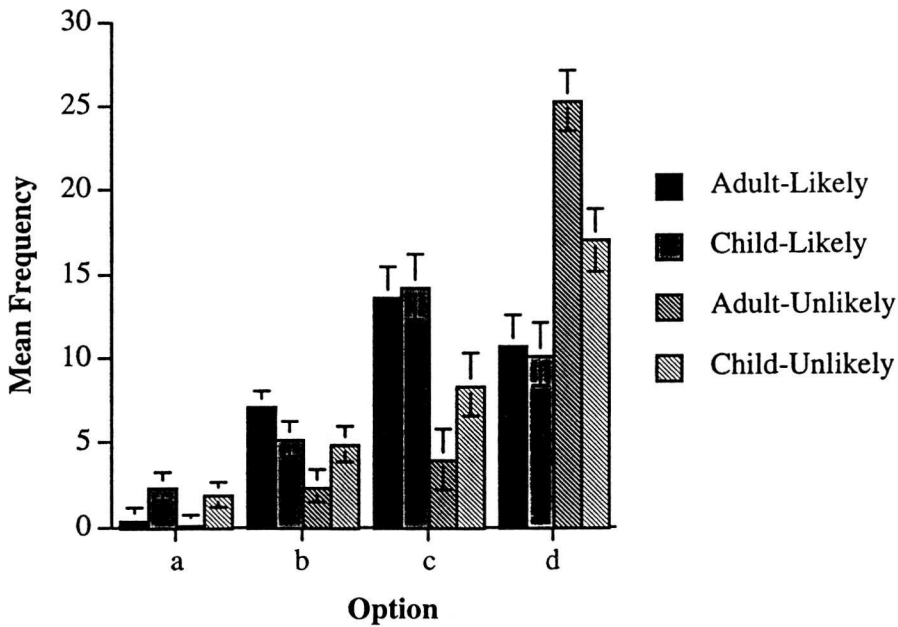
Figure 1. Mean frequency of responses to the four options by adults and children in the likely and unlikely conditions.

and segmentation (M=14.4, SD=9.9) were reported equally frequently and more often than direct retrieval (M=1.3, SD=3.4), HSD=2.01, p<.05.

There was a significant interaction between Option and Condition, F(4, 240)=84.59, p<0.05. Participants in the unlikely condition (M=19.0, SD=7.9) reported an analogy strategy more often than participants in the likely (M=13.7, SD=9.9) or open-ended (M=14.4, SD=10.9) conditions; conversely, participants in the likely (M=15.9, SD=9.9) and open-ended (M = 16.4, SD=10.8) conditions were more likely to report a segmentation strategy than participants in the unlikely condition (M=11.0, SD=8.0), HSD=4.66, p<.05. This finding may be associated with likeliness of the options in the unlikely condition: close examination of the segmentation strategies constructed for the unlikely condition in this study may have been more unlikely than the analogy strategies. Although the unlikely analogy strategies were somewhat ridiculous and never observed by Steffler et al. (1997), they were possible (e.g., *smag* is like *mag* with an *s* in front of it). The unlikely segmentation strategies, on the other hand, were phonologically incorrect. That is, the strategies presented did not accurately represent the phonemes of the nonwords. An example of a segmentation strategy used in the unlikely condition was *sma-mag.* Because the *ma* sound was repeated, the nonword represented by this strategy was actually *smamag* rather than *smag.* Thus the presentation of segmentation strategies that were more unlikely than the analogy strategies may have contributed to the use of more analogy strategies than segmentation strategies in the unlikely condition.

There was an interaction between Option and Group, F(2, 240)=4.99, p<0.05. Although children used analogy (M=13.6, SD=11.0) and segmentation strategies (M=16.2, SD=11.2) at a comparable frequency, adults used analogy strategies (M=17.8, SD=8.3) significantly more than segmentation strategies

(M=12.9, SD=8.3), HSD=4.89, p<.05. This finding that adults report analogy more than phonological segmentation strategies is consistent with the findings of Steffler et al. (1998).

Discussion

Our results indicate that the presence of response options in a research setting influences how participants respond. Both adults and children who were presented with likely options were more likely to choose them than participants who were presented with unlikely options. On the other hand, children were more likely than adults to accept the unlikely options as representing the strategies they used to spell the nonwords. Thus the likeliness of the response options appears to influence the responses that are obtained from children versus adult research participants. These findings extend the work by Schwartz and his colleagues (Schwarz, 1996; Schwarz & Hippler, 1991; Schwartz et al., 1985) to demonstrate that children are even more sensitive than adults to response options in an experimental setting.

The findings from our study have important implications for research methodology. Researchers need to acknowledge that how research is conducted may affect the results that they obtain. One caution involves the combination of closed-ended options with an open-ended option. The participants in our study were more inclined to choose a presented option than to generate their own answers. Rather than relying on the ubiquitous "other" option in questionnaires to pick up any accidentally omitted responses, researchers need to develop a better understanding of what responses are possible before writing a questionnaire or other closed-ended data collection device.

At the same time, researchers must also be wary of including only closed-ended questions because of the danger of question constraint. This occurs when the options presented to the participants are restricted and participants work in the framework of the presented response alternatives (Schwarz & Hippler, 1991). When the goal of research is to discover how or why something is done, it is crucial for participants to generate their own answers with as few experimental prompts as possible so that the data generated are valid and truly reflect the beliefs of the participants. This is particularly important when conducting research in an area that is not yet well established.

The findings from this study also have implications for research with children. The children in this study were more likely to choose presented options than were adults. More important, the children tended to choose even unlikely options. This implies that children may be more inclined to choose the options presented by the researcher regardless of how likely or unlikely the responses may be. Researchers working with children must be careful to present response options that are representative of responses that would be obtained in an open-ended situation.

Overall, our research supports the notion that context plays an important role in the experimental setting. It is important for researchers to recognize that the experimental setting itself may influence the results that are obtained as much as whatever the participants bring to the setting or the experimenter manipulates in the setting. In particular, researchers need to be cautious when deciding whether to use closed-ended questions. By being aware of the poten-

tial advantages and disadvantages of particular question formats, researchers can make more informed choices about the question format that may be most effective for their purposes.

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