DOCUMENT RESUME

ED 393 897 TM 024 856

AUTHOR Barnette, J. Jackson
TITLE Responses That May Indicate Nonattending Behaviors in Three Self-Administered Educational Surveys.
PUB DATE 9 Nov 95
NOTE 21p.; Paper presented at the Annual Meeting of the Mid-South Educational Research Association (November 9, 1995).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Attention; Behavior Patterns; *Educational Research; *Elementary School Students; Elementary Secondary Education; Questionnaires; *Responses; Secondary School Students; Statistical Analysis; *Surveys; Teachers; Test Items
IDENTIFIERS *Missing Data; *Self Report Measures

ABSTRACT

When self-administered surveys or questionnaires are administered, there is often a question of whether respondents have attended to the items in a thoughtful manner. This paper examines the results of three different surveys to investigate the occurrence of nonattending behaviors such as missing items, patterns that indicate lack of attentiveness, and failure to respond to reverse worded items. Data were collected from the following samples: (1) 1,240 primary-grade students from 27 schools; (2) 3,541 students in grades 5 through 12; and (3) 2,688 teachers. Analysis of the three data sets indicated that the problem of missing items throughout or at the end of the survey was not very prevalent and that typical statistical methods were adequate for dealing with this problem. Response patterns that might be associated with nonattending behaviors were noted, with monotonic or checker extreme patterns most evident in the youngest sample. It also appeared that 10 to 20% of respondents might not be attending to reverse wording of survey items. Further research will be needed to verify these patterns and determine their impact. (Contains 7 tables, 1 figure, and 11 references.) (SLD)

Responses that may Indicate Nonattending Behaviors in Three Self-Administered Educational Surveys

J. Jackson Barnette
University of Alabama
P.O. Box 870231
Tuscaloosa, AL 35487-0231

A paper presented at the

Annual Meeting of the

Mid-South Educational Research Association

November 9, 1995

A great deal of educational research and evaluation is based on the use of self-administered surveys or questionnaires, those where the respondent marks the survey form or optical scanning sheet. These may be taken on one's own time or taken as a voluntary or involuntary, somewhat captive, group. In such situations, there is often a concern about whether respondents are attending to the items in an attentive, thoughtful manner. Anyone who has used optical scanning sheets in collecting such data is likely to have encountered respondent "art work" such as initials, Christmas trees, or other systematic patterns.

The purpose of this paper is to examine results from three different surveys that may indicate nonattending types of survey behaviors including:

1. Missing items total and at end of survey,
2. Patterns that may indicate lack of attentiveness, and
3. Failure to respond to reverse worded stems.

Literature Review

The issue of error or bias associated with attitude assessment has been discussed for the past several decades. Cronbach (1970, pp. 495-499) discusses two behaviors which bias responses, those of faking and acquiescence. Faking behavior is characterized by a respondent consciously providing invalid information such as in providing self-enhancing, self-degrading, or socially desirable responses. Acquiescence relates to the tendency to answer in certain ways such as in tending to be positive or negative in responding to Likert-type items. Hopkins, Stanley, and Hopkins (1990, p. 309) present four basic types of problems in measuring attitudes: fakability, self-deception, semantic problems, and criterion inadequacy. While these certainly relate to biasing results, they are, at least in a minimal way, from attending respondents and, unless they are providing very extreme or random patterns, would be expected to have less influence than purposely, totally nonattending respondents.

Nunnally (1967, pp. 612-622) has indicated that some respondents have an extreme-response tendency, the differential tendency to mark extremes on a scale, and some have a deviant-response tendency, the tendency to mark responses that clearly deviate from the rest of the group. If such responses are thoughtful and, from the viewpoint of the respondent, representative of true opinions, then they should not be considered nonattending or spurious. However, if respondents

mark extremes or deviate from the group because of reasons not related to their opinions, then they would be considered to be nonattending respondents. He also discusses the problems of carelessness and confusion. These are more likely to be similar to what may be referred to as nonattending respondents. Respondents who are careless or confused, yet are forced, either formally or informally, to complete the questionnaire are more likely to provide spurious or nonattending responses.

Lessler and Kalsbeek (1992, p. 277) point out that "There is disagreement in the literature as to the nature of measurement or response variability. This disagreement centers on the nature of the process that generates measurement variability." They refer to the problem of individual response error where there is a difference between an individual observation and the true value for that individual.

In a review of several studies related to response accuracy, Wentland and Smith (1993, p. 113) concluded that "there appears to be a high level of inaccuracy in survey responses." They identified 28 factors, each related to one or more of three general categories of: inaccessibility of information to respondent, problems of communication, and motivational factors. They also report that in studies of whether the tendency to be untruthful in a survey is related more to personal characteristics or item content or context characteristics, personal characteristics seem to be more influential.

Goldsmith (1988) has conducted research on the tendency of providing spurious responses or responses which were meaningless. In a study of claims made about being knowledgeable of product brands, 41% of the respondents reported they recognized one of two fictitious product brands and 17% claimed recognition of both products. One of the groups identified as providing more suspect results was students. Another study (Goldsmith, 1989) where respondents were permitted to respond "don't know" and were told that some survey items were fictitious, the frequency of spurious response decreased, but not by very much. Goldsmith (1986) compared personality traits of respondents who provided fictitious responses with those who did not when asked to indicate awareness of genuine and bogus brand names. While some personality differences were observed, it was concluded that the tendency to provide false claims was more associated with inattention and an agreeing response style. In Goldsmith's research it is not possible to separate out those who purposely provided spurious responses as opposed to those who thought they were providing truthful answers. Perhaps only those who knowingly provided fictitious responses should be considered as providing spurious responses.

A study conducted by Marsh (1986) related to how elementary students respond to items with positive and negative orientation

found that preadolescent students had difficulty discriminating between the directionally oriented items and such ability was correlated with reading skills. Students with poorer reading skills were less able to respond appropriately to negatively worded items.

Respondent error could result from collection of data from different types of respondents. As Groves (1991, p. 3) points out: "Different respondents have been found to provide data with different amounts of error, because of different cognitive abilities or differential motivation to answer the questions well." Within this category lies the focus of this research.

When there are a large number of respondents, it is assumed that a small proportion of nonattending respondents is not likely to have much affect on the commonly used statistics. In many situations this is the case. In the review of the literature, there were no sources found which indicate how prevalent such respondents might be in different situations. In addition, there were no definitive studies of the effects of different types of response patterns which may be used by nonattending respondents on the commonly used statistics associated with self-administered questionnaires.

There are several possible reasons for a respondent to not attend to a questionnaire. Among them would be, the respondent may: (1) not understand the directions or items, (2) lack the experience or knowledge to accurately respond to the items, (3) lack the motivation to accurately respond to the items, (4) purposely over exaggerate responses out of anger, frustration, or some other emotional condition related or unrelated to the questionnaire topic, (5) want to finish the task as quickly as possible, and (6) be fatigued or become fatigued in the process of completing the questionnaire, particularly a long one.

As Bradburn and Sudman (1991) point out: "It is unrealistic to expect that most measurement errors will ultimately be eliminated. Optimistically, we should attempt to reduce those effects that can be reduced using the best survey methods and to understand and be able to measure the size of the effects that cannot be reduced."

Description of Data Sets

Three rather large actual data sets are examined in this study. Summary characteristics for each of these data sets are found in Table 1. Survey 1 was a survey of attitudes toward elements of children's literature. There were three forms of this survey: one was read to kindergarten and first graders and the students circled a very sad, sad, happy, or very happy face; one was written in very simple language for second and third

graders, and the third was at a higher reading level and was given to fourth through sixth graders. All three forms had 25 parallel items, all of which were worded in the same direction with a high score, on the four-point scale representing more positive attitude.

Data were collected from 1240 students from 59 different classrooms in 27 different schools in northern Alabama. The survey was scored using one to represent the most negative to four to represent the most positive responses. Cronbach's alpha for this survey was .817, based on 922 respondents who answered every item. The overall mean rating was 2.831 and the item standard deviation was 1.129.

Survey 2 was a survey of student attitudes toward classroom questioning. It had 57 items, each on a strongly disagree to strongly agree, four-point scale. Fourteen of the items were reverse worded such that either "disagree" response was a positive response. Data were collected from 3541 students representing grades five through 12 from more than 15 school districts in five different states. After reverse scoring the 14 reverse worded items, Cronbach's alpha for this survey was .875, based on 2633 respondents who answered every item, the overall mean rating was 2.177, and the item standard deviation was .925.

Survey 3 was a survey of teacher attitudes toward classroom questioning. It had 50 items, each on a strongly disagree to strongly agree, four-point scale. Nineteen of the items were reverse worded such that either "disagree" response was a positive response. Data were collected from 2688 teachers representing elementary, middle, and secondary schools from more than 20 school districts in five different states. After reverse scoring the 19 reverse worded items, Cronbach's alpha for this survey was .875, based on 2207 respondents who answered every item, the overall mean rating was 2.007, and the item standard deviation was .792.

Methodology

Three outcomes which may relate to nonattending behaviors were examined. For all three data sets, the frequency of missing items throughout the survey and frequency of missing items at the end of the survey were determined. Only surveys which had answers on at least one item were considered. There were some respondents in the data sets with no responses. However, since it could not be determined that these were actual respondents or that all those who did not participant were included in the data set, they were dropped from the analysis.

Item response patterns may indicate nonattending behaviors. For example, a respondent who marks the same response for every

item may not be attending, especially if there is a relatively high degree of item response variability from the total group. Such respondents would have low item variability and will be referred to as monotonic respondents. Item means could be at any point across the scale. A monotonic respondent who marked at all either the lowest or highest response set will be referred to as a mono-extreme while a respondent who marked all the same responses at a point close to the item mean for the total group will be referred to as a mono-middle respondent.

Another possibility of nonattending behavior would be marking half or a high proportion of each of the most extreme response possibilities. This respondent, which will be referred to as a checker-extreme, would have high item variability but an item mean around the middle of the scale. A respondent marking items on a random basis across the scale would have high item variability with a mean around the middle of the scale.

Examination of the item mean and variability patterns may provide a basis for identification of potential nonattending respondents. Of course, in any fixed response set, such as with Likert items, there is a relationship between the item mean and item variance. The closer the mean gets to one of the extremes, the lower the maximum possible item variance. If all items are marked at an extreme there can be no item variance. Maximum item variance is possible when responses are in the middle of the scale. Even though the item mean and item variance are not independent, certain combinations reflect response patterns.

Figure 1 provides a matrix of patterns of z deviations of respondent means and standard deviations from the total group values. Entries in the cells represent different row and column combinations. Cut-off values of the normal distribution to separate the distributions into lowest 10%, next 20%, middle 40%, next 20%, and highest 10% were used to determine the categories of this matrix. While most of the cells are not identified with any specific type of potential nonattending respondent, others may be. Cell 11 would be indicative of mono-extreme patterns at the low end of the scale, cell 51 would be indicative of mono-extreme at the high end of the scale and cell 31, and to a lesser extent cells 21 and 41, would be indicative of mono-middle respondents. Cell 35 would indicate high variability with a mean close to the over all item mean, a pattern similar to what would be expected of a checker-extreme.

The frequency and percent of respondents falling into these 25 cells was determined for the Survey 1 data set. Data from Surveys 2 and 3 were not used since they had reverse worded items. Only respondents with 70% or more valid responses were considered. The respondent item mean was computed and converted to a z score based on the standard error of item mean for the entire group. Then the respondent item was standard deviation

was computed and converted to a z score based on the standard error of the item standard deviation.

The third analysis compared the distributions of non-reverse and reverse worded items for Surveys 2 and 3. Since the items were very similar and the reverse worded items were distributed throughout the survey, it is assumed that if the reverse worded items were reverse scored they should demonstrate a similar pattern of responses to those items that were not reversed. For this analysis the reverse items were reverse scored (4 to 1, 3 to 2, 2 to 3, and 1 to 4). The two disagree responses were collapsed and the two agree responses were collapsed to ensure adequate cell expected frequencies. The frequency distributions were compared using one-degree of freedom chi-square statistics. The probabilities were computed for each respondent. A significant chi-square would indicate a difference in the proportions of disagree and agree responses between the non-reverse and reverse scored items, a situation which could be related to nonattending behavior.

Results

Missing Responses

Table 2 presents the results for the missing item analysis for Survey 1, which had 25 items. Of the 1240 respondents, 922 (74.4%) answered all items, 14.4% had one missing item, 5.1% had two missing items, and 6.2% had more than ten percent if the items missing. Only 1.8% had item scores missing at the end of the survey and most of them had only the last item missing.

Missing item results for Survey 2 are presented in Table 3. Of the 3541 respondents, 74.4% provided responses for all 57 items 16.2% had one missing item, 4.9% had two missing items, and 4.5% had three or more items missing. Only 2.3% had any items missing at the end of the survey. Slightly more than one percent (1.1%) had more than ten percent of the items missing at the end of the survey.

Survey 3 missing item results are presented in Table 3. Of the 2688, 82.1% answered all of the items, 11.8% had one missing item, and 6.1% had two or more items missing out of the 50 items. Only 2.4% of the respondents had missing items at the end of the survey, with 1.6% having ten percent or more missing at the end of the survey.

Based on these results, the proportion of missing items does not seem to be a major problem. Only about one-percent of the respondents leave ten percent or more missing at the end of the survey. It would be important to replace missing items in order to compute Cronbach's alpha based on a more complete data set.

These three data sets lost almost 23% of the subjects in computations of Cronbach's alpha due to missing items. Also, if total scores or subscale scores are needed, based on summing item responses, the missing items would have to be accounted for. However, the extent of missing items does not seem to indicate high occurrence of nonattending behaviors for these three survey data sets.

Response Patterns

It may be possible to identify nonattending respondents by examining patterns of responses. This was done with the Survey 1 by sorting the responses into the cells which represented low and high standard errors of the item mean and standard deviation. Table 5 presents the results of this sorting. As indicated previously, certain of these cells may indicate patterns of responses that would be expected from nonattending respondents. Cells 11 and 51 include patterns where the item mean deviates more than ±1.28 standard errors from the total item mean and the standard deviation deviates more than -1.28 standard errors from the total item standard deviation. These cells would indicate mono-extreme patterns. Examination of the response frequencies for these two cells in Table 6 indicates that for cell 11, 77.3% of the responses were ones and for cell 51, 83.4% of the responses were fours. These two cells represent 5.4% of the total respondents.

Monotonic patterns at or around the mean of the scale would be represented in cells 31 and 32. In cell 31, 67% of the responses were threes and for cell 32, 46% of the responses were threes, as compared with 26% for the total group. Of these, the responses in cell 31 (1.6% of the total group) seem to be candidates for nonattending respondent patterns.

Patterns with high response variability may also indicate potential nonattending respondents. These are represented by cells 15, 25, and 35. Respondents who mark mostly extreme patterns are referred to as checker-extremes. For cell 15, 58% responded with ones and 35% responded with fours; for cell 25, 47% responded with ones and 41% responded with fours; and for cell 35, 36% responded with ones and 52% responded with fours. For all cells with high item variability (represented by .5 in Table 6), 42% answered ones and 47% answered fours. These respondents represent 7.2% of the total respondent group. While there is not direct evidence that these represent nonattending responses, such responses are somewhat suspect when compared with the total respondent group.

Based on these results (5.4% for mono-extreme, 1.6% for mono-middle, and 7.2% for checker extreme), 14.2% of the respondents are providing response patterns which are consistent

with nonattending patterns. While it is likely that some of these are actually attending to the items, many of them are likely to not be attending.

Item Reversals

Surveys 2 and 3 had items which were reverse worded. It would be assumed that the distribution of nonreversed items should be about the same as the distribution of reverse worded items after the score scale was reversed. This analysis was based on comparing these distributions using $df = 1$, chi-square tests with the strongly disagree and disagree responses collapsed into one response category and the strongly agree and agree responses collapsed into the other response category. Thus, the chi-square was conducted on a 2X2 matrix; reversed and nonreversed items by agree and disagree. Observed chi-square values were computed and probabilities determined for each respondent.

Table 7 presents the results of this analysis. Survey 2 was completed by students and Survey 3 was taken by teachers. For Survey 2, which had 14 reverse worded items out of 57, 68.7% did not have a significant difference at $p<.05$. However, there were significant differences at $p<.05$ for 31.3% of the respondents. At the $p<.01$ level, 17.7% of the respondents were significantly different, and at $p<.001$, 9.7% had significant differences. Survey 3, which had 19 reverse worded items out of 50, had no significant differences at $p<.05$ for 74.2% of the respondents. There were 25.8% having significant differences at $p<.05$, 10.3% had significant differences at $p<.01$, and 1.6% had significant differences at $p<.001$.

A substantial proportion of respondents seem to not attend to reverse worded items. This seems to be more the case with the student group compared with the teacher group. Some of this may be due to providing monotonic patterns of responses without paying attention to the reverse wording, clearly nonattending behavior. However, another possible reason for some of these differences may be the tendency to be more willing to respond with a "strongly agree" response compared with a "strongly disagree" response. Reverse worded items would convert a "strongly agree" score point to a "strongly disagree" score point. When asked directly, the respondent may only be willing to mark a "disagree" rather than a "strongly disagree."

Conclusions

Analysis of these three data sets indicates that the problem of missing items throughout or at the end of the survey was not very prevalent. While there is a need to often account for

missing responses for purposes of determining reliability with complete data sets or to determine subscale or total score for inferential data analysis purposes, typical methods seem to be sufficient for dealing with this problem.

There was evidence of response patterns which may be associated with nonattending behaviors. The most obvious patterns of monotonic responses and checker extreme patterns were present in Survey 1. More than five percent of the respondents had all or a very high proportion of responses at all ones or all fours, evidence of possible monotonic behaviors. For more than seven percent of the respondents there was an almost even balance of ones (42%) and fours (47%) with only eight percent of the responses at two or three, a checker-extreme pattern. It seems likely that, to at least some degree, many of these could be nonattending respondents.

Surveys 2 and 3 had reverse worded items. Comparing the distributions of these two types of items, after reverse scoring the reverse worded items, a high percentage of respondents (almost 18% for Survey 2 and about 10% for Survey 3) had significant differences between reverse and nonreverse worded item distributions at $p<.01$. Thus, by chance, we would expect about 1% to be significantly different and the result here was much higher. Based on these results, it seems that there may be 10 to 20% of the respondents who may not be attending to the survey reverse wording of survey items.

Implications for Further Research

The results of this research are somewhat speculative. While there seems to be evidence of responses that may be associated with nonattending respondents there is no direct evidence that the respondents were not attending to the items. Studies need to be conducted to determine if these observed patterns and item reversals are really related to nonattending behaviors. If respondents are not attending to reverse worded items, we need to determine characteristics of respondents who do not or can not deal with negatively worded items.

If respondents are not attending, are these behaviors related to length of survey, captive vs. non-captive administration settings, anonymity of respondent, use of optical scanning devices vs. marking directly on the form, and different nonattending patterns on early vs. later items? Also, what are the effects of nonattending response patterns on commonly used survey statistics: internal consistency reliability, survey means and variances, and effect sizes? This is an area of research which has not received very much attention, yet when we consider how often we use these instruments it would seem critical that we determine the extent to which such behaviors exist, how to

identify them, determine their effects, and consequences of keeping them in the data base.

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	z_s deviations				
z_m deviations	<-1.28	-1.28 to <-0.52	-0.52 to +0.52	>+0.52 to +1.28	>+1.28
<-1.28	11	12	13	14	15
-1.28 to <-0.52	21	22	23	24	25
-0.52 to +0.52	31	32	33	34	35
>+0.52 to +1.28	41	42	43	44	45
>+1.28	51	52	53	54	55

Figure 1. Matrix of z standard error deviations from item means and standard deviations

Table 1. Characteristics of each data set

	Survey 1 Grades K-5	Survey 2 Grades 5-12	Survey 3 Teachers
Sample size	1240	3541	2688
Number of items	25	57	50
Number of reverse worded items	none	14	19
Item mean*	2.831	2.177	2.007
Item standard deviation*	1.129	0.925	0.792
Alpha internal consistency*	0.817	0.875	0.875
Alpha based on n of	922	2633	2207

* Based on reversed items for surveys 2 and 3

Table 2. Percent of items left missing across and at end for Survey 1, 25 items, n= 1240

Number Missing	Percent Missing	Across all items f	Across all items %	At end of survey f	At end of survey %
0	0.0	922	74.4	1218	98.2
1	4.0	178	14.4	14	1.1
2	8.0	63	5.1	0	0.0
>2	more than 10	77	6.2	8	0.6

Table 3. Percent of items left missing across and at end for Survey 2, 57 items, n= 3541

Number Missing	Percent Missing	Across all items f	Across all items %	At end of survey f	At end of survey %
0	0.00	2633	74.4	3459	97.7
1	1.75	574	16.2	33	0.9
2	3.51	175	4.9	4	0.1
3	5.26	52	1.5	1	0.0
4	7.02	19	0.5	1	0.0
5	8.77	16	0.5	4	0.1
>5	more than 10	72	2.0	39	1.1

Table 4. Percent of items left missing across and at end for Survey 3, 50 items, n= 2688

Number Missing	Percent Missing	Across all items f	Across all items %	At end of survey f	At end of survey %
0	0	2207	82.1	2623	97.6
1	2.0	317	11.8	18	0.7
2	4.0	75	2.8	2	0.1
3	6.0	30	1.1	1	0.0
4	8.0	8	0.3	1	0.0
>4	10 or more	51	1.9	43	1.6

Table 5. Frequency and percent of respondents of z standard error deviations from item mean by item standard deviation, Survey 1, n= 1223

	z_s deviations											
z_m deviations	<-1.28 .		-1.28 to <-.52		-.52 to +.52		>+.52 to +1.28		>+1.28		Total	
	f	%	f	%	f	%	f	%	f	%	f	%
<-1.28	9	0.7	7	0.6	42	3.4	25	2.0	6	0.5	89	7.3
-1.28 to <-.52	5	0.4	13	1.1	106	8.7	74	6.1	33	2.7	231	18.9
-.52 to +.52	20	1.6	80	6.5	257	21.0	155	12.7	48	3.9	560	45.8
>+.52 to +1.28	15	1.2	50	4.1	131	10.7	32	2.6	1	0.1	229	18.7
>+1.28	57	4.7	30	2.5	27	2.2	0	0.0	0	0.0	114	9.3
Total	106	8.7	180	14.7	563	46.0	286	23.4	88	7.2	1223	

Table 6. Distribution of item responses for selected item mean and standard deviation z standard error deviations, Survey 1, n= 1223

Group →	Total	11	51	15	25	35	1.	5.	.1	.5
n	1223	9	57	6	33	48	89	114	106	88
Percent missing	1.8	2.2	1.5	3.3	2.2	3.3	2.5	1.9	1.9	2.9
Percent 1	18.5	77.3	0.4	58.0	47.2	36.3	51.8	3.8	7.0	41.7
Percent 2	16.8	19.6	0.8	2.7	4.0	3.8	18.4	2.1	10.1	3.7
Percent 3	25.8	0.0	13.9	0.7	5.3	4.6	13.8	13.3	31.1	4.5
Percent 4	37.2	0.9	83.4	35.3	41.3	52.1	13.5	79.0	49.9	47.1
Mean	2.83	1.23	3.83	2.14	2.42	2.75	1.89	3.71	3.26	2.59
Item SD	1.13	0.48	0.43	1.44	1.43	1.42	1.10	0.69	0.91	1.44

Table 7. Differences between reversed and nonreversed item distributions for Surveys 2 and 3, chi-square probabilities, df=1

	n	%, p>=.05	%, p<.05	%, p<.01	%, p<.001
Survey 2	3520	68.7	31.3	17.7	9.7
Survey 3	2658	74.2	25.8	10.3	1.6