STRUCTURAL DETERMINANTS OF MAIL SURVEY RESPONSE RATES
OVER A 12 YEAR PERIOD, 1988-1999[1]

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One of the most nagging and difficult questions to answer about response rates to mail surveys concerns whether response rates have been declining in recent years, as they appear to be for telephone surveys. Another question about which little is known is the extent to which characteristics of particular survey populations influence the level of response that can be achieved when using particular design and implementation procedures. Our purpose in this paper is to provide tentative answers to these questions.

Over a 12-year period, from 1988 through 1999, 102 sample surveys of visitors to U.S. National Parks were conducted by the same sponsor using very similar questions about visitor experiences in the park, and a common set of implementation procedures, except for two features: the length of each questionnaire and the number of replacement mailings. Statistically it is possible to estimate the effect of year of study on response rates for these two major variations in study procedures found in the past to be a major determinant of final response rates (Heberlein and Baumgartner, 1978; Dillman et al., 1974; Dillman, 2000).

In addition, the visitors to each national park constitute a unique survey population, differing with regard to average age, distance traveled, time spent and other structural features that might influence response rate.

This paper provides results from regression analyses in which each park becomes a unit of observation. The 102 response rates (one per park) are then regressed on these structural variables, year of study, questionnaire length, and number of replacement questionnaires in order to understand their individual and combined effects on survey response rates.

THEORETICAL BACKGROUND
Influence of Year of Survey

Today's conventional wisdom is that response rates are declining, especially for telephone surveys. It is much less clear whether response to mail surveys is also declining. An article by de Leeuw, Mellenbergh and Hox (1996), suggests that mail response rates may be staying the same or rising slightly. It is difficult to obtain convincing estimates of possible decline, because relatively few surveys are conducted by the same procedure year after year, and at the first indication of decline surveyors often invoke stronger procedures to compensate. The questionnaires and implementation procedures used in the surveys analyzed here were judged sufficiently similar that a response analysis over time could be accomplished.

Salience as an Underlying Population Variable

Heberlein and Baumgartner (1978) measured salience by examining each questionnaire and making a judgment as to whether the respondents were likely to find it "interesting" to complete. We measure salience in this study by linking park attributes and whether the visitor who is asked to evaluate them is likely to have found the visit to be an interesting or memorable experience. We seek to go beyond the work by Heberlein and Baumgartner (1978) by being able to specify population characteristics that give rise to salience, i.e., greater or lesser interest in the survey topic. Should it be discovered that measurement of salience in this way has a positive influence on response, this research would provide confirmation of the importance of this variable as an important determinant of response.

Conceptually, there exist strong grounds for expecting salience of an experience to influence response rate. Webster's dictionary defines the salience as something that is "strikingly conspicuous; prominent" (Webster's II New Riverside University Dictionary 1984:1032). Social psychological theories of behavior tend to focus the role of salience in knowledge storage, activation, and accessibility. Past research suggests that salient information receives more attention and therefore increases the amount of recall, as well as makes recall easier (Higgins, 1996). It also suggests that salient information receives enough attention for the individual to make a judgement about the situation, and this knowledge is more likely to be activated in the presence of a stimulus.

Our use of the term salience combines several of these components. An experience is salient for an individual when her attention is held by the experience and she is able to make inferences about the experience—both of which make the experience more memorable and create more lasting impacts on the respondent. Respondents seem more likely to respond to things concerning a salient experience than they are to respond to things concerning a nonsalient or less interesting and/or memorable experience. Therefore, we expect that the greater the salience of the park visit, the more likely a sampled visitor is to complete a questionnaire evaluating the nature of their experience.

A number of park and park visitor characteristics appear to have a saliency aspect. We expect a visit to a national park to be more salient to a visitor if it has these qualities: 1) The respondent lives further away, requiring greater time and effort to get there; 2) Visiting the park is a unique experience, in that the respondent could not visit other important places the same day. Travel time gives an opportunity to digest and reflect on the experience. This attribute would seem to characterize parks in rural, more isolated locations; 3) The visit is a first visit, rather than a repeat trip to where the person has been previously; and 4) The respondent spends more time in the park and participates in more activities.

Other Variables

It was possible from the data available across all of the park satisfaction surveys to develop measures of two personal characteristics for this study. One measure concerned age of the respondent, asked at the time in which each sampled visitor was given the mail-back questionnaire. The second is whether the person visited the park alone or with others.

The negative effect of age is well established in the survey literature (c.f., Groves and Couper, 1998; Dillman, 1997). We are not aware of literature which measures the influence of a social variable, such as whether the park was visited alone or with others. It seems reasonable that visiting a park with someone else would increase the likelihood of responding, in part because of the way in which people were asked to complete the questionnaire, as described in the section on survey procedures.

We also recognize that there are different kinds of parks. Some parks are primarily recreational, while others are significant as historical sites, and yet others have full designation as a National Park. Visitors to recreational areas may be less likely to return their questionnaires because of being there to engage in recreational activities that can often be experienced elsewhere, rather than to visit a unique site or location. Visitors to a historical park may be more likely to return their questionnaire because of the historical significance of the park they are visiting. The other park characteristic we include is the number of visitors to the park. This is a measure of popularity of the park, among other things. Parks that have a larger number of visitors may be seen as more important to visit.

These "other" variables might be used as additional indicators of salience. However, we have categorized them separately, inasmuch as they seem, at best, to be less direct indicators of salience than the previously discussed variables dealing with the park's location and respondent's investment in visiting it.

SURVEY PROCEDURES

A total of 102 visitor satisfaction studies were conducted by the National Park Service from 1988 to 1999. A detailed description of these procedures is provided in Dillman and Carley-Baxter (2000).

In brief, when visitors arrived to the park, every n^{th} visitor group was asked to pull to the side of the road (or, if on foot, to step to the side of the entry) to speak with another uniformed park attendant where the study was explained, and a request made to complete the questionnaire. In addition, they were asked to provide their address so that the National Park Service could thank them for participating by sending them a postcard.

The questionnaire given to all respondents was from 12 to 16 pages long, printed in a booklet, and contained from 8 to 31 questions. The questionnaires posed questions specific to each park, so exhibited some differences. However, because each questionnaire was aimed at measuring participation in activities offered by the park and satisfaction with the visit, questionnaires can be considered as quite similar, often containing identically worded questions.

The back of each questionnaire contained a return address and a real postage stamp. A tab with adhesive tape was partially attached to the questionnaire so that the protective surface could be removed and each questionnaire sealed for mailing. Most importantly, the questionnaire design procedures remained the same throughout the 12-year period.

Approximately two weeks later, respondents were sent a colored picture postcard depicting a scene from the park. The left hand portion of the address side of the postcard contained a brief message from the park superintendent thanking them for their participation in the survey. Two weeks later, nonrespondents in some parks were sent a letter and replacement questionnaire. A second replacement questionnaire was sent to nonrespondents in certain parks approximately three weeks later.

Definitions and Coding of the Variables

Parks, rather than individual visitors, constitute the unit of analysis for this report. The proposed regression analysis was designed to consist of 102 cases (or parks), with each variable being a park measure, rather than individual person measure.

Two critical steps were involved in creating the variables for this analysis. The first, was to determine whether data were available from all 102 of the individual studies, each of which had from 76 to 1,065 respondents. Thus, the analysis is by necessity limited to information that is available for all or virtually all of the parks.

The second step was to determine how each of the variables could be coded to represent each park. For some variables, this step was accomplished quite easily. For example, response rate, the dependent variable, and several of the independent variables, e.g., whether located in a metropolitan area and the number of visitors per year, could be coded directly.

But, for other variables, the decision was more difficult. Some of the variables we are interested in are individual level responses, yet we have to convert these into aggregate data since each park can have only one observation per variable in our data set. Collapsing the individual level data into one dummy variable for each park loses potentially valuable information about how each variable may affect response rate and therefore may not adequately represent the distribution of the variable for that park. Consequently, we have chosen to create subvariables for several of our main variables. These subvariables are coded as the percent of the respondents from a particular park that fall into each variable category. A check for nonconstance variance showed that we met the assumptions of constance variance, so we chose to proceed with the analysis using percentage data for several of the variables.

Dependent Variable

Response Rate: Response rate for each park is the basic dependent variable for this study. It is defined as the number of returned questionnaires divided by the number delivered to sampled park visitors. The range for this variable is 60-90%, with a mean of 79%.

Independent Variables
Salience of the Experience

1. Metropolitan vs. nonmetropolitan location of the park: This variable refers to whether the park is located in a metropolitan or nonmetropolitan area. It is coded 1 = nonmetropolitan area, 2 = small metropolitan area (up to 1 million people), and 3 = large metropolitan area (more than 1 million people). The mean for this variable is 1.93.

2. Relative isolation of the park: This variable also refers to the location of the park and uses distance away from an interstate highway as the measure. This variable should be, and is, correlated to met/nonmet (correlation is .63). The variable is coded 1 = off-shore (Alaska, Puerto Rico, etc.), 2 = greater than one hour off a major interstate, 3 = less than one hour off a major interstate, 4 = directly off a major interstate. The mean for this variable is 2.9.

3. Distance traveled to the park: This variable refers to whether the respondent was a local visitor who lived close to the park or a nonlocal visitor who lived farther away from the park. We used the respondents' zip codes and the park zip code to estimate the distance visitors from each of the zip code areas would have to drive to reach the park from their residential location. This concept is coded into four subvariables: percent of respondents who live within three hours of the park (range 0-98) thus making the trip both ways in a single day possible, percent of respondents who live within 3 to 6 hours of the park (range 0-49) thus making an overnight stay in the area of the park likely, percent of respondents who live between 6 and 12 hours of the park (range 0-46), and respondents who live 12 or more hours away from the park (range 1-100).

4. Length of visit: This variable refers to how long the respondent visited the park. It is coded into three subvariables: percent of respondents who visited up to one-half day (4 hours; range 0-100), percent of respondents who visited one-half to one day (4-10 hours; range 0-53), and percent of respondents who visited one day or more (10 hours or more; range 0-99).

5. Activities participated in: Each park offers different activities for visitors. This variable measures the number of activities in which the respondent reported participation. We coded this variable as the proportion of the total number of offered activities (as listed in each questionnaire) in which the respondent participated (range .11-1.0). We then multiplied this variable times 100 so that it would have a range similar to the variables calculated using percentages.

6. Number of visits: This variable refers to the number of times the respondent visited the park. It is coded into two variables: percent who visited the park once (range 4-97), and percent who visited the park more than once (range 3-96).

Other Independent Variables

7. Group type: This variable is coded into two variables: percent of those who visited the park alone

(range 0-47) and the percent of those who visited the park with others (range 53-100).

8. Age: Age was coded as three variables: percent of respondents who are 39 years of age or younger (range 7-63), percent of respondents who are 40 to 59 years old (range 28-55), and percent of respondents who are 60 years or older (range 4-50).

9. Year: This refers to the year each survey was conducted. Based upon research that suggests response rates to surveys have been declining, we expected that in recent years response rates would be lower. This variable is coded as 1 to 12.

10. Type of park: The National Park Service uses many designations to categorize parks. For this study, we have coded the parks as one of the following: recreational areas, historical sites, or actual National Parks using Park Service designations. We have coded park identity into three dummy variables: recreational park versus other, national park versus other, and historical park versus other.

11. Number of visitors: This refers to the number of visitors to each park in 1998, the most recent year for which visitor numbers are available on the National Park Service web site. This park has been coded as 1 = up to 200,000 visitors, 2 = 200,001 to 1 million visitors, 3 = more than 1 million visitors. The mean for this variable is 2.17.

12. Replacement questionnaires: These were not used for four park surveys in 1989. Of the remaining surveys, 46 of them used one replacement questionnaire and 52 surveys used two replacement questionnaires. After 1996, all studies used two replacement questionnaires. This variable is coded 0=0 replacements, 1=1 replacement, and 2=2 replacements.

13. Length of questionnaires. Three measures of length were created. They include: number of pages, 12-16; number of questions, 8-31; and number of variables. These measures were found to be highly correlated with one another r .72 to .80). It was decided to retain only number of questions as originally the most visible indicator to the respondent of the effort required to complete the questionnaire.

FINDINGS

Correlations Between Independent Variables and Response Rate

Table 1 provides the bivariate correlations between each of the independent variables and response rate. A number of the variables are correlated fairly strongly with response rate. Far more of the relationships are statistically significant than not significant.

It can also be seen in Table 1 that four of the five salience variables—metropolitan location, greater iso-

lation of the park, distance lived from the park, length of visit, and the percent making a first visit, exhibit significant relationships in the expected directions. Proportion of activities engaged is the only salience variable that does not achieve significance.

Table 1. Bivariate correlations between independent variables and response rate.

Salience of the Experience	
Metropolitan	-.45****
Relative Isolation	-.23**
Distance R Lives from Park:	
% Within 3 hours	-.52****
% 3-6 hours	.33****
% 6-12 hours	.36****
% >12 hours	.27***
Length of Visit:	
% Half-day or less visit	-.34****
% Half-day or 1 day visit	-.10
% >1 day visit	.43****
Number of Visits: % 1 visit	.35****
Proportion Activities Participated In	-.02
Personal Characteristics	
Type of Group: % Alone	.18*
Age: % <40 years	-.28***
% 40 to 59 years	.04
% Over 59 years	.26***
Park Characteristics	
Park Type: Recreation	-.23**
National	.13
Historic	.06
Number of Visitors to Park	-.02
Year	-.30***
Length of Survey	
Number of questions	-.25***
Replacement Questionnaire	-0.37****

*p≤.10, **p≤.05, ***p≤.01, ****p≤.001

Two of the three age measures are significantly related to response rate. The relationships are in the expected direction of older people being more likely to respond. Table 1 also suggests that response rates have declined with time.

Overall, it can be seen that many of the zero-order correlations are substantial in magnitude and in the hypothesized directions. An important exception is the type of group, alone vs. with others. It appears that people who traveled alone were more likely to return questionnaires than were those who traveled as part of a group.

Examination of the replacement questionnaire effect, shown in Table 1, reveals that its correlation with response rate is a -.37. Inasmuch as it is logically

impossible for the use of a replacement questionnaire to lower a response rate, we conclude that the survey sponsors must have been making the decision to use replacements when they expected low response and/or observed low initial returns. Because no replacement procedures were used only in 1988 and 1989, one replacement was used only in 1988-1995, and two replacements were used after 1990, with all studies using two replacements after 1995; the correlation with year of study is obvious.

As expected, the number of questions asked is negatively correlated (-.25) with response rate. Further examination revealed that year of study, number of replacements, and number of questions were highly intercorrelated with year X number of questions = .84, year X number of replacements = .70, and number of replacements X number of questions = .57.

Regression Analysis

The purpose of the regression analysis is to determine the extent to which the salience, population characteristic, and year of study could individually and collectively account for variation in response rates across parks. A series of five regression models was run. They were as follows: 1) all variables and subvariables for those with multiple measures, excluding the redundant last subvariable, 2) all variables and subvariables for those with multiple measures, excluding the first subvariables instead of the last, 3) a step-wise regression equation containing only the individually significant variables, 4) the same step-wise equation plus the corresponding subvariables for those with multiple measures, 5) equation 4 plus all other variables, and 6) the step-wise equation from 3 with other variables hypothesized to be important predictors of the response rate. (See Dillman and Carley-Baxter, 2000, for details of these analyses.)

The variables in each of these equations was examined for the effects of multicollinearity by calculating the variation inflation for each of the variables. The variance inflation scores ranged from 1.29 to 3.14, and all tolerance scores were above 0, both of which indicate no problems with multicollinearity.

Proportion of activities was the only measure of salience that did not exhibit a significant relationship with response rate, and generally had low correlations with all other variables. Neither year nor number of replacement questionnaires reached significance, presumably because of the high zero order correlation with length of questions.

The results are strikingly similar across all models. All of the full regression models were significant, with each of the six models explaining from 51 to 54% of the variation in response rates. The various manipulations did little to affect either the amount of variation explained or the variables that accounted for it. The step-wise regression equation (number 3) is reported in Table 2.[2] Five of the seven factors lower response rates. They are: location of the park in a metropolitan area, visiting the park ½ to 1 day, visiting the park with others, being younger (and particularly under 40), and number of questions. The two factors that relates positively to response rate are living a greater distance from the park (as opposed to living less than three hours away), and visiting the park once. The proportion of explained variance is 49% (Table 2).

Table 2.   **Final response rate on the independent variables.**

	Unstandardized Regression Coefficient	Standardized Regression Coefficient	Standard Error
Salience of the Experience			
Metropolitan location	-1.93***	-0.25	0.67
% Live Within 6-12 Hrs	0.18***	0.28	0.05
% Visit ½ to 1 Day	-0.05***	-0.24	0.02
% 1 Visit	0.08**	0.23	0.03
Personal and Social Characteristics			
% Visit With Others	-0.15**	-0.19	0.07
% Less Than 40 Yrs Old	-0.14**	-0.20	0.06
Length of Survey			
Number of questions	-0.46****	-0.34	0.11
Intercept	105.39		
R-squared	0.49****		
Model df	7		
Total df	101		

*p<.10, **p<.05, ***p<.01, ****p<.001

DISCUSSION

It is clear from these data that year of study did not have a significant effect on the mail survey response rates reported here. These data provide evidence that mail survey responses, at least for these studies, have not declined during the last dozen years. Rather, any observed decline appears to be the result of surveying populations for whom the questionnaire on visitor behavior is less salient and because of using questionnaires of greater length.

These data also provide support for salience, as a characteristic of the survey population, having a significant influence on response rate. Two of the salience variables were significantly related to response rate in all of the equations, and the absence of two others is likely explained by their close association with the

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[2]We also ran the regression analysis using the backward procedure and obtained the same results.

other salience measures that did appear in the equations. These data support the earlier findings of Heberlein and Baumgartner (1978) that salience is a significant determinant of response rate. This support is noteworthy because of the quite different approach taken to its measurement here than that which was used in the earlier study. Rather than making a judgment of the questionnaires likely interest to the respondent, we were able in this study to measure salience as a characteristic of the survey population (e.g., distance people lived from the park), thereby tying it to the behavior of population members. In addition, the importance of age as a determinant of response rate, evident from previous research, is also reconfirmed by this analysis.

Whether one traveled alone or with a group turned out to be a significant predictor of response in the stepwise regressions. In addition, it was in the opposite direction to that which we had expected. People who came to the parks alone were more likely than those who were part of a group to return their questionnaire. We had reasoned that people were more likely to return the questionnaire if they were part of a group, thinking there might be encouragement or reminders from others, based in part on the a procedure by which the respondent was selected and handed the questionnaire. That turned out not to be the case; apparently returning questionnaires is more of a singular activity, at least for the topic and populations investigated here.

This study has several limitations. The questionnaire was delivered in-person, rather than by mail, and that may limit our ability to generalize to mail questionnaires delivered in that way. The topic of the surveys concerned visitor activities in national parks, and the populations of visitors to each park. Other topics and populations might provide different results than those observed here. Nonetheless this study provides insight into the influence of seldom measured population variables on mail survey response rates, and provides evidence that indeed the 1990's has not been a time of declining response rates for at least this mail-back survey.

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