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ABSTRACT

Experimental studies of response rates to mail surveys were reviewed and differences in response by population type were described. Cases were selected for review if they were experimental studies that manipulated a response enhancement factor. Results suggest significant differences in typical response rates for different populations. Higher response rates may be expected from surveys of customers and educators than from surveys of the general population. Results suggest few significant differences in effects of experimental treatment by population type, a result possibly due to limited sample sizes and thus low power for such analyses. One appendix lists the 22 studies reviewed, and the other presents treatment definitions and representations. (Contains 4 tables and 12 references.) (Author/SLD)

Effects of Population Type on Mail Survey Response Rates and on the Efficacy of Response Enhancers

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Abstract

Experimental studies of response rate to mail surveys were reviewed and differences in response by population type described. Higher response rates may be expected from surveys of customers and educators than from surveys of the general population. Results suggest few significant differences in effects of experimental treatment by population type, a result possibly due to limited sample sizes and thus low power for such analyses.

It is useful to approximate the return rate for the targeted population prior to fielding a mail survey. While survey return rates change from context to context, foreknowledge of a typical return rate would allow us to plan our methodology with more confidence. As part of our method involves considering ways to maximize response, it would be useful to know whether effects of treatments intended to enhance response rates differ with different target populations. The purpose of this study was to (1) provide estimates of return rates for eight distinctly defined populations and (2) assess differences in the effect sizes of nine treatments designed to enhance response rates by type of population.

A limited number of studies have reported the effects of population definition on response rate. Baumgartner and Heberlein (1984) summarize findings from their 1978 review. They found lower return rates with general populations and higher returns with employee, school, and army populations. Their results for North American general populations were supported for European populations by Eichner and Habermehl (1981). Goyder (1982) found less difference between general and employee populations, with higher rates of return for school or army populations. Eichner and Habermehl found a slightly higher return rate for an employee than for a general population. All three studies found higher response rates for military and school populations.

Miller (1991) provides a table showing the variability of response rate by occupation and city of residence for five occupational types and five northeastern United States cities. These response rates vary from 43% to 67% by occupation and from 37% to 67% by city. Miller further presents a compilation of response rates to questionnaires sent to samples from the general public, adult women, and eastern urban business leaders. Survey response rates varied from 24% to 71%. While useful, Miller's presentation was based on a small, unsystematically chosen sample of studies and seems intended to convey how variable return rates are. Dillman (1978) provides another compilation of response rates to surveys using his Total Design Method. He found response rates that varied from 50% to 94%. His work provides us useful information, and again, was based on an extensive but unsystematic sample of studies.

Effects of response-enhancing treatments have also been examined for different populations. Jobber (1986) found a precontact letter to have a negative effect with an industrial population but a positive effect with household populations. The use of personalization has been supported with household populations, while Jobber reports nonsignificant effects in two of three studies with industrial populations. Further, effects of a small incentive ($.10) were positive with five industrial populations but insignificant with two of three household populations. Yammarino, Skinner, and Childers (1991) associated response rate and design variables for samples of consumer and institutional (e.g., educational, industrial, health care) groups. Data were obtained from 184 studies in their meta-analysis. They found follow-ups had greater impact on response rates for institutional groups than consumer groups. Stamped versus metered return postage was more influential with institutional groups than consumer groups.

These findings suggest to the researcher that varying response rates may be expected when surveying different populations and that distinct approaches to enhancing returns may be beneficial when surveying different populations.

The present study compiled response rates by type of population for a systematically selected sample of studies, thus extending the work of Dillman (1978) and Miller (1991), and evaluated effects of population type on effects of treatment, thus following the work of Jobber (1986) and Yammarino et al. (1991).

Method

Cases in the current study were selected if they were experimental studies that manipulated a response enhancement factor. More complete information about survey response by population type could certainly be obtained by compiling a census of responses to all surveys reported in the literature. Such an undertaking, however, is beyond the scope of this study. Thus, cases were selected that met the following criteria: The study used a mail survey, was published or presented in the English language, was conducted in the United States, and reported use of a manipulated treatment.

Computer searches of the four CD-ROM databases described below were conducted using the search terms "mail survey*" combined with "response rate*." The ABI/Inform database contains marketing and business publications. Sociofile contains social science works, PSYCLit (now PsychInfo) represents psychology, and ERIC contains education publications and documents. Sources were also found by examining reference lists from previously published reviews. Articles were omitted if response rate could not be identified or calculated, if information describing the population was omitted, if the study was not experimental, or if the treatment could not be clearly classified. Of the approximately 400 citations identified for inclusion in this study, 222 were included in the analyses, though not all cases had complete data. The list of studies providing the data for the current work forms Appendix A.

Population type was then coded as general public, customers, professional other than education, educators, college students, military, business people/employees, trades/agriculture, and "other." The sample size was also coded. Prior analyses have used sample size as a covariate in analyses, though to little effect. Also coded were the type of journal or conference in which the paper appeared (business, education, other), whether the topic was general or targeted for the sample, whether a self-addressed stamped envelope was enclosed or not, whether a follow-up mailing was sent or not, whether the cover letter was described or not, and whether the sample was randomly selected or not. Response rates to the initial mailing were recorded for experimental and comparison conditions. An exception to this occurred for studies in which follow-up was the manipulated treatment, for which responses to the follow-up mailing was recorded. The differences among experimental and comparison conditions were then computed. While most studies had two levels of each independent variable, some used multiple treatments. Effect size was calculated as the difference in response rate between the treatment and control conditions if two levels of the treatment variable existed, or as the pairwise difference among treatment conditions for studies using more than two levels of the treatment variable. Population categories with fewer than three cases utilizing a particular treatment were excluded in analysis of treatment effects. The analysis-wise Type I error rate was set at .05. This error rate does not accomodate inflation of Type I error due to multiple tests but did allow us to discern moderate effects with samples of very small size.

To examine response rate differences between populations, response rates were aggregated by population over all studies. Studies employing more than one treatment were represented by only one overall response rate. If more

than one treatment was reported, the overall response rate reported in the publication was used. If the response rates for levels of a single treatment treatment variable were reported in a study, response rate was calculated by averaging over the levels of that treatment. To examine treatment effects, response rates were aggregated by treatment for the populations with at least three cases. There were 15 separate types of treatments represented. Treatment types, the number of cases for each treatment type, and a brief definition of the treatment type are provided in Appendix B. The significance of differences in response rates was tested using analysis of variance.

Results

The highest proportion of studies sampled the general public (29%: Table 1). Customers made up the next most frequently sampled population category. Mean response rates for the nine population types vary. Military, blue collar, and "other" were excluded in most analyses due to small sample sizes. Response rates differed significantly across the six remaining groups, $F(5, 203) = 3.44$, $p < .006$. Pairwise differences were assessed with Tukey's HSD test, with significant differences found between the general population response rate and that of educators and between the general population and students. In keeping with analyses of previous studies, the moderating effects of sample size were examined. Sample size was not significantly correlated with response rate ($r = -.11$, $p = .11$) and had no effect on results when used as a covariate.

Table 1 here

Interactions among population type and other coded variables were examined using analyses of variance. Interactions were found for population type and use of a self-addressed, stamped envelope ($p < .03$) and for population and use of a follow-up ($p < .04$). Use of a SASE produced a higher response rate for the general public, educators, students, business persons, and blue collar workers but not for the professional or military groups. Studies reporting clear use of a follow-up also reported a higher response rate for professionals, customers, and students but not for the general public, educators, or military groups. This result does not address the effects of follow-up but rather speaks to the clarity of the article in noting whether a follow-up was used.

Response rates and effect sizes by treatment variables and population type are presented in Table 2. Table 3 presents results of the analysis of differential effectiveness of response-enhancing treatments for the ten treatments that had at least two population categories with at least three cases. The remaining five treatment types and population categories were not included in this analysis due to small sample sizes. The dependent variable in these analyses was the difference in response rate between two levels of the experimental variable (e.g., enclosed incentive versus no incentive). Differences across population type were significant only for effects of follow-up and sponsorship (university versus commercial). When population type was collapsed into only two categories (general versus other), a main effect was again found for the treatment variable follow-up, with a stronger effect of follow-up (16.3%) for specified populations ("other") and a weaker effect (3.4%) for the general population, $F = 14.82$, $p < .004$. It should be noted that the sample sizes for population types were low in most analyses and that collapsing across categories in different ways may have produced

different results. For example, while the effect of population type on levels of incentive manipulations was not significant, the effects of enclosed versus promised incentives varied from 4.3% for business persons to 21.5% for professionals. This is quite a wide range.

Tables 2 and 3 here

Interactions of population type with other coded variables for each treatment variable were examined using analyses of variance. Of the numerous analyses run, one interaction significant at $p < .05$ was found. For the incentives levels of promised/enclosed versus no incentive, the effectiveness of the incentive was stronger for a targeted than general survey of a general population but weaker for a targeted rather than general survey of other populations, $F(1,69) = 4.23$, $p < .05$. Table 4 provides te mean effects for population type by survey type.

Table 4 here

Discussion

Response Rate Comparisons Between Populations. Results suggest significant differences in typical response rates for different populations. In particular, response rates in mail surveys of customers, educators, and students were significantly (as much as one third) higher than those obtained in surveys of the general public after only one mailing. This finding is consistent with that of Baumgartner and Heberlein (1984) in that the surveys of the general population had lower response rates than students, employees, and military personnel. Differences in response rate by these population types may be explained partly by different typical educational levels for these groups. There is strong support for effects of education on response rate (Green, 1995), and professional, educational, and student groups have average educational levels higher than that of the general population.

Sudman and Bradburn (1984), commenting on high response rates from members of professional groups, surmised that two of the factors facilitating high response rates to mail surveys were the high educational level of the individuals and their familiarity with forms and questionnaires, and the relevance of the questionnaires which usually related to topics associated with their professional activities and interests. It is likely that surveys directed to specific target populations were of more relevance to those populations than were surveys sent to the general public. Questionnaires are generally sent to individuals who can provide the answers to the questions being sought. Surveys sent to the general public invite comments from all sections of the population and may lack salience to many of them. This cannot be determined absolutely without examining the topics of the individual surveys, and even then determination of salience or relevance is subjective.

Differential Effect of Response Enhancers. Dillman (1991) has commented that different survey procedures may be needed in different situations. While many aspects of the survey are up to the discretion of the researcher, the population generally comes under the heading of fixed variables that are implicit in the particular undertaking (Bruvold & Comer, 1988). If the population is specified, it then becomes beneficial to know what procedures may be most effective with that population. Results of this study do not suggest that members of different population types respond differently to many

of the various survey manipulations that were studied. This result contrasts with those of Jobber (1986) and partially contrasts with those of Yammarino et al. (1991). There were, however, differences in coding of population types and the variables examined between those studies and the present study. Yammarino initially coded samples into the following categories: consumers, educational, industrial, health care, government, and other institutional but collapsed them into two groups, consumer and institutional, for statistical purposes in the meta-analysis. Jobber, on the other hand, was interested primarily in comparing industrial with nonindustrial populations. The surveys cited in his tables represent an assortment of industrial populations, including business persons, business executives, technical personnel, employees, salespeople, road transport operators, industrial safety engineers, industrial accountants, and so forth.

Yammarino's only significant effect across populations was for follow-ups/repeated contacts. We found a significant effect across populations for follow-ups. They did also detect a nonsignificant but noticeable effect for stamped versus metered return postage. Jobber conducted no statistical analysis on the information contained in his tables (reporting on "industrial" population surveys) or between the studies he cited and non-industrial surveys.

While effects of most treatments were not statistically significant, differences due to treatment in the present study have been shown to vary according to the target population. It must be noted that in many cases the number of surveys providing data is very small. However, there is some consistency across populations for variables such as anonymity, with a total of 15 surveys surveys being represented. Treatment effects ranged from -4% to +4%. No matter what population was being surveyed, the effect was on average no more than 4%. Similar situations occurred when comparing the use of mailing labels versus individually addressed envelopes, colored questionnaires, and status of the sender. Although significant population effects were found only for follow-up and sponsor, noticeable, and in some cases more dramatic, differences between populations were evident for appeal, incentives, personalization of postage, postage class, and precontact.

It must be noted that this paper does not provide an exhaustive review of all surveys done with particular populations, but rather includes only those providing empirical evidence of the effect of specific treatments. While the design factor was a constant, surveys within any one group still differed from each other in numerous ways.

A major limitation of this study is the small number of surveys investigating a particular treatment variable within a specific population. A strength, however, is the limited inclusion of those studies that were experimental in nature and could isolate the effects of the treatment variables within each study. Continued efforts will identify a larger body of studies to contribute to this initial effort, allowing investigation of more of the variables across populations and providing greater stability of the findings. A contribution of this study is that it provides an opportunity to compare response rates of more specific groups than has been possible in previous reviews.

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Table 1. Proportion of Sample and Response Rate by Population Type

Population Type	% of Sample	Response Rate			
		Mean	SD	Min	Max
General Public	29.0	35.3	13.4	7.5	67.1
Business	8.6	40.7	24.4	3.5	72.5
Customers	16.7	44.2	16.7	10.6	90.2
Blue collar/skilled, agriculture	3.2	30.1	14.9	16.5	55.5
Professionals	15.4	41.0	17.5	3.9	80.5
Educators	9.5	48.2	18.5	19.5	82.8
Students	13.6	48.0	17.2	18.5	85.2
Military	1.8	40.3	9.7	27.5	51.0
Other	2.3	41.1	11.5	33.3	59.5

Table 2.
Response Rate and Effect Size by Experimental Treatment and Population Type

Treatment	1[a]	2	3	4	5	6	7	8	9
Anonymity									
Mean Response Rate	43.6	52.6	44.5		50.0	62.7	65.0	41.5	
Standard Deviation		29.3	14.3		0.0	21.9	0.0	0.0	
Mean Effect Size	1.0	2.6	-1.8		-4.0	-2.4	4.0	-4.0	
N of Studies	2	3	4	0	1	3	1	1	0
Appeal									
Mean Response Rate	48.1	55.5	29.1		33.1	38.3	65.5		
Standard Deviation	9.9	19.1	5.1		3.3	7.2	0.0		
Mean Effect Size: A[b]	-7.7	-.9	-1.0		.3	-3.3	3.0		
B	1.8	-10.5	1.9		5.5	-5.5			
C	-7.9	1.4	3.0		-4.7	0.0			
N of Studies	5	2	2	0	5	3	1	0	0
Color									
Mean Response Rate		19.7		19.6	33.7		50.4		
Standard Deviation		7.5		0.0	9.6		.5		
Mean Effect Size		3.9		-1.2	-1.9		3.0		
N of Studies	0	2	0	1	2	0	2	0	0
Deadline									
Mean Response Rate	21.8	18.8			38.4		49.1		
Standard Deviation	0.0	0.0			6.2		0.0		
Mean Effect Size	7.6	3.2			-.4		-1.5		
N of Studies	1	1	0	0	4	0	1	0	0
Follow-up									
Mean Response Rate	29.2	62.7	56.2	17.9	48.0	33.9	47.1		
Standard Deviation	15.9	0.0	15.5	0.0	12.3	0.0	17.7		
Mean Effect Size	3.4	27.3	12.1	10.6	13.0	15.2	21.0		
N of Studies	6	1	4	1	3	1	3	0	0
Incentives									
Mean Response Rate	33.8	35.8	42.7	31.2	40.9	53.0	49.6		
Standard Deviation	12.7	24.0	15.9	13.2	20.6	8.7	10.5		
Mean Effect Size: D	17.8	4.3	16.7	8.1	21.5	14.4	9.7		
E	17.8	11.0	14.3	13.3	17.2	13.5	16.3		
F	3.4	.1	4.7	3.6	1.7	3.8	3.9		
N of Studies	23	7	13	3	18	2	9	0	0
Length of Survey									
Mean Response Rate	36.4	58.9	50.2			57.9	48.6		
Standard Deviation	9.8	0.0	24.3			17.8	13.9		
Mean Effect Size	-5.2	5.9	-2.8			-2.4	-8.3		
N of Studies	7	1	2	0	0	6	4	0	0

table continues

Table 2 (continued)

Treatment	1	2	3	4	5	6	7	8	9
Personalization-- Labels									
Mean Response Rate	30.5		59.4			24.5	45.2		
Standard Deviation	4.7		0.0			7.1	25.3		
Mean Effect Size	2.2		-3.8			-4.0	3.4		
Personalization-- Survey									
Mean Response Rate	34.5	27.7	39.4	41.2	42.4	44.0	48.9	39.7	
Standard Deviation	16.2	3.7	9.3	20.2	17.8	19.8	23.4	0.0	
Mean Effect Size	5.5	3.9	1.1	-2.7	5.3	2.0	7.9	9.3	
N of Studies	12	2	10	2	7	8	6	1	
Personalization-- Postage									
Mean Response Rate	29.4	53.3	40.9	26.8	41.5	58.2	30.9		
Standard Deviation	9.7	27.2	16.1	10.5	11.1	0.0	16.7		
Mean Effect Size	4.6	19.2	3.6	6.6	6.0	-2.4	2.8		
N of Studies	12	2	4	2	5	1	3	0	1
Postage Class									
Mean Response Rate	25.0		35.5	28.1	40.8		38.1	48.8	
Standard Deviation	7.1		1.7	16.3	18.5		14.3	0.0	
Mean Effect Size	19.0		5.8	-1.6	17.7		12.4	24.5	
N of Studies	2	0	2	2	3	0	4	1	0
Precontact									
Mean Response Rate	35.7	47.7	50.7		39.6		44.4	39.3	59.5
Standard Deviation	12.2	25.9	26.0		18.3		17.7	16.6	0.0
Mean Effect Size	12.5	3.8	11.2		11.2		14.1	6.5	-11.0
N of Studies	15	5	7	0	2	0	4	2	1
Sponsor									
Mean Response Rate	35.8	27.8	43.4		29.5				
Standard Deviation	7.6	21.3	18.3		0.0				
Mean Effect Size: G	14.5	12.4	6.3		10.0				
H	3.0	11.5	14.3						
I	8.3	12.0	10.1		7.9				
N of Studies	3	2	4	0	1	0	0	0	0

table continues

Table 2 (continued)

Treatment	1	2	3	4	5	6	7	8	9
Status of Sender									
Mean Response Rate		33.0	33.7		55.0	58.6			
Standard Deviation		0.0	4.3		27.6	14.3			
Mean Effect Size		1.0	-1.4		0.1	1.4			
N of Studies	0	1	2	0	2	2	0	0	0

[a]Population Types are: 1--general public, 2--business, 3--customers or alumni, 4--blue collar/skilled, agriculture, 5--professionals (not educators), 6--educators (teachers, professors), 7=students, 8=military, 9=other.

[b]Effects are: A--social-sponsor, B--social-egoistic, C--sponsor-egoistic, D--enclosed-promised, E--enclosed-no incentive, F--promised-no incentive, G--university-commercial, H--university-research, I--university-nonuniversity.

Table 3. Analysis of Variance of Treatment Effects by Population Type

Treatment	Effect for Population Type 1[a]	2	3	4	5	6	7	8	F	df	p
Anonymity--Mean		6.3	-1.8			-2.4			2.08	2,7	.20
SD		9.1	4.0			4.2					
n		3	4			3					
Appeal--A[b] Mean	-7.7				.3	-3.3			.64	2,5	.56
SD	13.9				4.0	3.4					
n	2				3	3					
B--Mean	1.8				5.5	-5.5			1.02	2,2	.49
SD	0.0				7.8	7.8					
n	1				2	2					
C--Mean	-7.9				-4.7	0.0			1.14	2,4	.40
SD	6.9				0.0	1.4					
n	4				1	2					
Follow-up--Mean	3.4	18.00							19.58	1,4	.02
SD	4.1	2.8									
n	4	2									
Incentives											
D--Mean	17.8	4.3	15.9	8.1	21.5		15.9		.94	5,15	.40
SD	15.6	1.6	1.5	4.7	8.0		1.5				
n	8	2	3	2	5		3				
E--Mean	17.8	11.0	14.1	13.3	17.2		16.3		.62	5,53	.69
SD	11.5	9.6	5.5	3.5	7.8		14.6				
n	19	6	10	3	15		6				
F--Mean	3.4	.1	4.6	3.6	1.7		3.9		.46	5,29	.80
SD	6.7	1.3	4.6	1.8	4.1		3.7				
n	12	3	8	2	6		4				
Length --Mean	-5.2					-2.4	-8.3		.41	2,14	.67
SD	9.4					11.9	7.8				
n	7					6	4				
Personalization											
Survey --Mean	5.5		1.1		5.3	2.0	7.9		1.26	4,38	.30
SD	4.3		8.6		6.2	7.3	8.8				
n	12		10		7	8	6				
Postage--Mean	4.6		3.6		6.0		2.8		.30	3,20	.83
SD	5.2		4.2		5.9		2.9				
n	12		4		5		3				

(table continues)

Table 3 (continued)

Treatment	1	2	3	4	5	6	7	8	F	df	p
Postage Class											
--Mean					17.7		12.4		.51	1,5	.51
SD					5.9		11.5				
n					3		4				
Precontact-Mean	12.5	3.8	11.2				14.1		1.02	3,27	.40
SD	9.9	1.4	11.8				15.7				
n	15	5	7				4				
Sponsor G--Mean	14.5		6.3						29.43	1,2	.04
SD	2.1		.4								
n	2		2								
H--Mean	3.0		14.3						5.27	1,2	.15
SD	1.6		6.8								
n	2		2								
I--Mean	8.3		10.1						.15	1,5	.71
SD	5.7		6.0								
n	3		4								

Note. Numbers of studies vary from Table 2 due to lack of relevant information in all reports.
[a]Population Types are: 1--general public, 2--business, 3--customers or alumni, 4--blue collar/skilled, agriculture, 5--professionals (not educators), 6--educators (teachers, professors), 7=students, 8=military.
[b]Effects are: A--social-sponsor, B--social-egoistic, C--sponsor-egoistic, D--enclosed-promised, E--enclosed-no incentive, F--promised-no incentive, G--university-commercial, H--university-research, I--university-nonuniversity.

Table 4. Interactive Effect of Population Type and Topic Type on Difference in Response Rates for Promised/Enclosed versus No Incentive Treatment

	General Survey			Targeted Survey		
	Mean	SD	n	Mean	SD	n
General Population	11.3	8.8	20	20.1	11.8	3
"Other" Population	12.7	7.3	20	9.7	8.5	30

Note. Population types were collapsed into general versus all other types combined.

APPENDIX A

References for Studies in the Database

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APPENDIX B

TREATMENT DEFINITIONS AND REPRESENTATION IN DATA BASE

Treatment Type	Definition	Cases
Anonymity	Survey identifiable or not.	15
Color	Survey copied on white or colored paper.	7
Cover Letter Appeal	Three levels: appeal to betterment of society (social utility appeal), benefits to survey sponsor (sponsor appeal), benefits to respondent (egoistic appeal).	18
Deadline	Due date listed in cover letter or not.	7
Follow-up	Phone, letter, or postcard follow-up or not.	20
Incentives	Three levels: enclosed incentives, promised incentives, or no incentive.	75
Personalization of Cover Letter	Cover letter/survey personalized (hand-signed, personal inside address) or not.	49
Personalization of Labels	Labels personalized (hand-typed) or not (machine generated).	10
Personalization of Postage	Postage personalized (regular, commemorative stamps) or not (business reply).	30
Length	Longer or shorter.	20
Postage Class	High class or lower class.	15
Precontact	Precontact (phone, postcard, letter) or not.	38
Salience	Relevance of survey topic of sample (more or less).	5
Sponsor	Three levels: university, research firm, commercial organizations.	7
Status	Higher or lower status of cover leter signator (e.g., professor vs. student)	

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