AN INVESTIGATION OF THE RESPONSE RATES IN A RANDOM-DIGIT-DIALED TELEPHONE SURVEY OF SOUTHERN CALIFORNIA [1]

Valerie T. Dull and Rick Kosterman

ABOUT THE AUTHORS.

Valerie Dull received her Ph.D. from the University of California at Santa Barbara in Social Psychology. At the present time she is a Senior Public Administrative Analyst for the Institute for Social Science Research at UCLA.

Rick Kosterman is a graduate student in Social Psychology at UCLA. His primary area of research has been political psychology and survey methodology.

In recent years the use of telephone surveys has gained widespread acceptance as an effective method of studying a variety of social issues. The advantages of telephone surveys--decreased cost, greater demographic coverage, centralization, quality control and expediency--together with the findings that show little or no difference on substantive results with other survey methods, have led to a greater reliance on the telephone as a useful data gathering instrument (Marcus and Crane 1986; Thornberry and Poe 1982; Massey, Marquis and Tortora 1982; Jordan, Marcus and Reeder 1980; Aneshensel and Yokopenic 1985).

Response rates have received quite a bit of attention in telephone surveys, especially in comparison with face-to-face methods (Fitti 1979; Massey, Barker and Hsuing 1981; Thornberry and Massey 1983). Results of these studies indicate that telephone surveys generally have lower response rates than face-to-face by as much as 20 percentage points (Thornberry and Poe 1982). Lowered response rates are not desirable in surveys because they have the potential for leading to non-response biases in the data. This situation occurs when certain sub-populations, that differ from the target population as a whole in systematic ways, are not represented in the survey data. The generalizability of the data to the target population is then jeopardized. Because of the potential for non-response bias in telephone surveys, reasons for non-response and potential strategies to overcome this problem should be closely investigated.

Another practice often criticized in telephone and face-to-face surveys alike is the use of inexperienced interviewers (Tuchfarber and Klecka 1976).

Again, the presumed biasing effect of this practice is that of systematic non-response on the part of less acquiescent respondents who are therefore more challenge of interviewers. On the other hand, it would seem that the centralized nature of telephone surveys allowing for constant evaluation and feedback for new interviewers would reduce any problems associated with technique and skill.

The purpose of this paper is to analyze (1) the response rates of a study that surveyed white and minority populations in Southern California, (2) the effectiveness of follow-up calling on reducing non-response with associated processing times for different outcomes, (3) the differences, if any, in response rates between trained students and professional interviewers, and {4) the impact of new technology on non-response and sample processing in general. This particular project provides an ideal opportunity to shed new light on these questions because few large-scale studies of this type are performed in the region and because frequent follow-up attempts were made to households until either the interview was obtained or the study was halted.

METHOD

In winter, 1986, the Institute for Social Science Research at the University of California, Los Angeles conducted the Southern California Social Survey, an omnibus study encompassing a tricounty area: Los Angeles, Ventura and Orange counties. This annual computer-assisted telephone interview (CATI) study is used as both a training opportunity for graduate and undergraduate students and as a research tool for social science departments. The questionnaire content included general items on health, politics, and other lifestyle issues.

A simple random-digit-dialed (RDD) sample was computer generated for area codes and prefixes in the survey region, with Black and Hispanic areas over-sampled by a factor of 15 to l. A customized CATI program handled all call scheduling and case assignments. The tracking of all interviews and outcome dispositions also occurred on-line. Respondent selection was handled by CATI using a computerized roster-selection procedure that picked one eligible adult at random from out of all adults mentioned to interviewers by household informants. One respondent over the age of 18 was chosen from each household for interviewing. If the selected individual was not available for interviewing at the time of contact, a callback was scheduled by entering date and time to call into the computer.

Interviewers for this project consisted of paid professionals and undergraduate juniors and seniors from a class on public opinion and voting behavior. Both groups were exposed to the same training information, although students were provided with more written material and less verbal presentation than were professionals. Training sessions emphasized three separate substantive areas. These were interviewing technique, technical equipment operation, and interpersonal telephone dynamics. In addition, all interviewers were asked to complete a practice interview on which they were given feedback. Besides information presented verbally, the project coordinator distributed two manuals: one covering interviewing skills and the second covering technical equipment operation.

During this survey, 2,664 households were contacted from out of the 7,140 numbers dialed. These contacts yielded a total of 1,038 completed interviews at the time the study was terminated.

RESULTS

Overall Response Rates

Final dispositions for all cases are shown in Table l. Outcomes are broken down by three sections: households, non-households, and no contact dispositions. Out of all 7,140 cases contacted, 60 percent were non-household phone numbers, and of these, over 60 percent were non-working or not-in-service numbers. The second largest non-household disposition was the business or pay phone category, which accounted for another 32 percent of all non-household contacts.

The no-contact group of disposition represents cases for which a final decision could not be made as to whether they were households or unassigned/ non-household numbers. The phone company representative could not report specific information except to say whether the number was working or non-working. This information, then, was only helpful for categorizing numbers that were not in service; working numbers we assumed were still potential households that may have required further contact attempts. Nevertheless,

Table 1. Final Outcomes

	% of Category	(N)	% of Overall Sample	(N)
Contact with household			37	(2664)
Complete; multiple contacts	18	(479)		
Complete; first contact	16	(433)		
Complete; converted refusal	5	(126)		
Total completes	39	(1038)		
Refusal; before R selected	29	(779)		
Refusal; after R selected	6	(149)		
Refusal; interview in progress	1	(31)		
Total refusals	36	(959)		
Callback; R selected	5	(121)		
Callback; no R selected	2	(60)		
Callback; interview interrupted	2	46		
Total callbacks	9	(227)		
Spanish language needed	8	(213)		
Incapable or ill	4	(94)		
Other language	3	(69)		
Answering machine	2	(59)		
No eligible respondent	0			
Total other	17	(440)		
Contact with non-household			60	(4251)
Business, office or pay phone	32	(1343)		
Group quarters (dorm, etc.)	1	(22)		
Other non-residence (car phone, etc.)	1	(52)		
Total non-residence	33	(1417)		
Not in service, not working, or not a real number	60	(2552)		
Changed to a new number	5	(195)		
Wrong connection, or wrong switch	2	(87)		
Total other	67	(2834)		

No contact			3	(225)
No answer	71	(160)		
Fast busy or fast ring	13	(30)		
No ring	5	(12)		
Busy	5	(11)		
Broken connection (mechanical)	4	(10)		
Circuit overloaded	0			
Temporarily not-in-service	0			
Total no contact	98	(225)		
Overall total			100	(7140)

difficulties such as these left only 3 percent of all cases in an undetermined status at the end of the study as shown in the "no contact" category.

Household phone numbers represented 37 percent of the entire RDD sample. Complete interviews were obtained for 39 percent of these households and the refusal rate was 36 percent (computed as number of completes or refusals over all households not including no-contact dispositions). The completion rate likely would have been increased if not for the limited duration of this study (dictated by the academic quarter). This is evidenced by the large number of cases--9 percent of all households--finalized as callbacks (i.e., initial callbacks were about 35 percent more likely to be completed than refused). Another reason for the low completion rate was that all refusals could not be recontacted for a conversion attempt, again due to time constraints. In the final sample, 12 percent of all completed interviews were refusal conversions. In addition, although 101 interviews were conducted in Spanish using a standardized translation, a large number of Spanish households could not be recontacted for interviewing because of limited availability of Spanish-speaking interviewers.

One interesting aspect of Table 1 has to do with the large number of informants, almost 30 percent of all households, who refused to continue either before or during the solicitation of a household roster. This category includes all immediate hang-ups that took place during the introduction as well as those cases where informants objected to providing a roster for respondent selection. It should be noted that the standard greeting and introduction to the survey was informative but quite brief. Of all 525 first- attempt refusals, 504 or 96 percent took place before the respondent was chosen. The remaining 21, or 4 percent, declined after the roster had been filled out and a respondent selected (see Table 2). In these cases the information is not available regarding whether the informant refused to bring the selected individual to the phone or whether the selected respondent refused. Clearly, however, once a roster had been completed, the likelihood of obtaining an interview was very high.

Follow-up Calling

The effectiveness of follow-up calling (i.e., any call made after the first attempt) is shown in Table 2. The first column shows the outcome disposition for the first attempt with the percentage and number of cases with that outcome. The middle column reports the average number of total attempts for cases with each of the associated initial outcomes. Finally, reports of frequencies and percentages for major outcomes are given, broken down by final disposition.

The second largest first outcome category (after "not in service") was the "no answer" group of cases. A substantial number of these, 26 percent turned out to be businesses or pay phones. Pay phones were determined if someone happened to be near the phone when it rang and answered it. It is unfortunate that these unusable numbers required more than one dialing. However, the majority of all business/pay phone numbers, 56 percent, were determined on the first attempt. And, although 31 percent of all business/pay phone dispositions required multiple dialings on non-answered initial calls, it is somewhat misleading to use 4.5 as the average number of attempts for these calls. This is because an average of seven attempts were made for cases that were never answered (i.e., finalized as "no answer"), while non-household numbers were called an average of only two times. Thus, non-household cases were determined relatively quickly. Over 41 percent of all non-answered initial calls turned

Table 2. First and Final Outcomes with Average Number of Attempts for Major Categories

First Attempt	(N)	Avg Number of Attempts	Final Outcome	%	(N)
Refusal; before R selected	(504)	3.0	Refusal	66	(334)
			Complete	12	(61)
			Callback	3	(16)
Refusal; after R selected	(21)	5.3	Refusal	43	
			Complete	38	(8)
			Callback	9	(2)
Callback; R not selected	(318)	4.5	Complete	37	(119)
			Refusal	35	(110)
			Callback	11	(35)
Callback; R selected but not available	(204)	4.8	Complete	53	(109)
			Refusal	18	(37)
			Callback	15	(30)
No answer	(1642)	4.5	Business or pay phone	26	(420)
			Complete	19	(308)
			Refusal	18	(293)
			No answer	9	(149)
			Callback	4	(65)
			Answering machine	1	(17)
Busy	(611)	4.0	Not a real number	34	(208)
					(114)
			Business or pay phone	19	
			Complete	15	(94)
			Refusal	13	
			Callback	3	(16)
			No answer	1	
Spanish language needed	(199)	3.0	No interview	48	(95)
			Complete	25	(50)

			Refusal	11 (21)
			Callback	9 (19)
Not in service, not working, not a real number	(1983)	1.0		
Business, office, or pay phone	(748)	1.0		
Complete; first attempt	(218)	1.0		

OVERALL TOTAL DIALINGS = 17,988

NOTE: Percentages in each category do not sum to 100 because not all final outcomes are shown.

out to be households on later attempts and these were called an average of 3.4 times.

In the "respondent selected but not available" callback category 53 percent eventually were completed. If an informant scheduled a callback without having selected a respondent, there were about an equal number of final refusals as to completes; 37 percent in this category eventually completed the survey while 35 percent finally refused. Twenty-two percent of all completed interviews were at one time placed in one of the various callback dispositions that required the highest average number of attempts. The relatively small average number of attempts for "refusals" and "Spanish language needed" again reflected the short duration of this study.

The conclusion that can be drawn from this analysis is that follow-up calling was very effective in that it produced 79 percent of all completed interviews. Ultimately the question that remains, however, is how many follow-up calls are optimal. Of course, this is a relative question given the varying priorities of different studies, but a useful guide can be derived from the data. Table 3 presents a rough look at the status of the data had we been less persistent in placing follow-up calls. As noted previously, callbacks were repeatedly scheduled for most "promising" cases until either a complete was obtained or the study was halted.

Groves and Kahn (1979) note that two or three calls were usually "enough" to reach a final disposition on a household number. After three calls in their two samples they were able to finalize slightly over 50 percent of all household numbers. This SCSS sample was somewhat more successful in this regard; after the third call over 70 percent of all households had been finalized. In addition, nearly 71 percent of all completes had been collected by this time. A look at the overall RDD sample, after three attempts, shows that more than 79 percent of all phone numbers had been finalized. The largest category of cases remaining after the third call was the "no answer" category. There were 813 of these cases that represented about 11 percent of the entire sample that went unanswered after the third attempt. Dropping down further in Table 3, note that these percentages increase to almost 90 percent of the entire sample and 88 percent of the households that had been finalized after the sixth attempts, with nearly, 90 percent of all completes collected and only 5 percent remaining unanswered. After fifteen attempts 1,027 of 1,038 completes had been collected (98.9 percent) and almost every case finalized (99.0 percent), including over 98 percent of the household numbers; virtually none of the active numbers remained unanswered (0.4 percent).

As noted before, if there was still no answer after five to six calls, an off-line call was made to the phone company to determine whether the number was unassigned or out of order. If this could not be determined the number remained active. "No answer" cases are probably the most difficult field problem to deal with in telephone samples of this type. Conservatively, one should count them as unreached households. However, this practice could reduce response rates artificially, especially in rural areas and in metropolitan areas with new area codes (as is the case in greater Los Angeles). Any method of calculating response rates for telephone interviews should probably include a note about how these types of outcomes were handled.

Processing Times for Different Dispositions

Since the survey was conducted on CATI, all processing times were collected for every case dialed and average time calculated per disposition. This information is useful because in a simple RDD sample (as in this study) a

Table 3. The Status of the Data Following 1 to 20 Attempts

Number of Attempts	% of Entire Sample Finalized (N=7140)	% of Households Finalized (N=2664)	% of All Completes (N=1038)	% of Sample Unanswered (N=7140)
1	55.7	35.5	32.4	23.0
2	71.9	58.0	57.1	15.0
3	79.5	70.3	70.8	11.4
4	84.6	78.8	80.0	8.9
5	89.6	84.1	85.8	7.6
6	92.8	87.7	89.7	4.8
7	94.3	89.6	91.9	3.3
8	95.6	91.9	93.9	2.4
9	96.5	93.4	95.4	1.9
10	97.1	94.6	96.1	1.8
11	97.8	95.8	96.8	1.4
12	98.4	96.9	97.8	1.2
13	98.7	97.3	98.0	1.0
14	99.0	97.8	98.3	0.7
15	99.3	98.3	98.9	0.4
16	99.5	98.8	99.2	0.4
17	99.6	99.0	99.3	0.3
18	99.6	99.1	99.4	0.2
19	99.7	99.2	99.5	0.2
20	99.7	99.3	99.6	0.2

Note: Some cases handled off-line were prematurely "finalized" automatically by the CATI system. The effect of this was to slightly overestimate the percentages reported in columns 1 through 3, but rarely by more than 1 percentage point. Precisely accurate percentages were not retrievable given the manner in which the data were stored.

large number of the phone numbers are non-working or ineligible. It would be helpful to evaluate the extent to which an interviewer's time is wasted on bad phone numbers. Table 4 shows the breakdown of processing times per major outcome.

As reported, household cases took the longest time to process. This category averages across all dispositions processed for households, including

completed interviews.

Fortunately, non-households (e.g., businesses and non-working numbers), in addition to unknown cases (e.g., no answer or busy), took the least amount of time to process at an average recorded time of less than two minutes. This processing included dialing time and a simple logging procedure on a paper-

Table 4. Average Processing Time Per Outcome

Outcome	Minutes
All households	10.5
Complete	(36.7)
Callback (scheduling time)	(5.7)
Refusal	(3.8)
All non-households	1.7
Unknown (e.g., busy, no answer, etc.)	1.8
Any new case (first time seen by any interviewer)	3.4
Overall average processing time for all dialings	4.2

and-pencil back-up sheet. Scheduling callbacks took almost six minutes. The CATI scheduler had been programmed to ask for very detailed information at the conclusion of each request for a callback. This is done in order to provide helpful information--best time to call, notes stating a reason for the call-back, etc.--for the next interviewer that will receive the case. Obviously, these callback cases are known to be households so this was presumably time well spent. The relatively high eventual completion rate of first-attempt callbacks, 44 percent, indicates that this processing time was indeed useful. However, it will take future studies to determine exactly what kind of information is most helpful in producing successful recontacts.

Interviewer Performance Differences

Since the use of inexperienced interviewers, particularly students, has been criticized, it is informative to analyze differences in response rates for students and professionals. Students were told that they needed to complete 20 hours of interviewing within the quarter. One-third of their grade was dependent on their performance as interviewers, and this was based primarily on effort and attendance. Each student was scheduled for two day shifts, two night shifts, and two weekend shifts. Professionals were compensated on an hourly wage basis with no incentive pay of any kind. Their shifts varied but were primarily concentrated in late afternoon and evening hours. Because the class enrollment was large and each student had been asked to complete 20 hours at CATI terminals, only a few interviewing professionals occupied stations during the average shift.

Table 5 shows percentages of major outcomes computed over household attempts by each group. Professional interviewers processed 17 percent of these outcomes while students processed over 82 percent. In general, student interviewers appeared to perform at levels below that of paid interviewers. Professionals completed more interviews per dialing than did students and students also received more frequent refusals to participate than professionals. Feedback from supervisor evaluations of interviewing techniques seem to indicate that students had a lower threshold for accepting refusals than did professionals. These observations were supported by a logit analysis indicating that student-versus-professional interviewer was a stronger determinant of receiving a refusal once an eligible household had been reached

Table 5. Percentages of Major Outcomes for Student versus Professional Interviewers

Outcome	% Students (N=85)	% Professionals (N=11)
Completes	5.3	9.7
Refusals (all types)	9.4	7.9
Refusal; interview in progress	0.3	0.3
Callback; R selected	6.9	8.5
Callback; no R selected	6.1	8.6
Callback; interview interrupted	2.3	1.9
Answering machine	4.7	4.4
No answer	47.2	40.9
Busy	13.8	14.4

Note: Percentages are based on proportion of given outcome from 11,0176 student and 2,266 professional dialings resulting in household, or no-answer and busy, types of dispositions.

(beta = -.25, $p < .001$) than either time of shift (beta = -.03, not significant), weekday versus weekend (beta = .10, $p < .01$), or sex of interviewer (beta = -.10, $p < .01$). A similar analysis of the effect of these variables on obtaining a completed interview also found student-versus-professional to be the strongest determinant (with beta of .23, .12, .11, and .02, in the same order as above, with the first two significant at the $p < .001$ level, the third significant at $p < .05$, and sex of interviewer not significant; student interviewer, evening shift, weekend shift, and female interviewer were coded high throughout).

However, the negligible differences in callbacks once the interview had started (i.e., "callback; interview interrupted") and other types of break-offs (e.g., "refusal; interview in progress") seem to indicate that once past the introduction and roster sections, most of the difference between the groups in administering the questionnaire were minimal. On the basis of supervisor feedback, in almost all cases, students administered the interview in a highly professional manner. This conclusion is based on the continual monitoring and evaluating that was conducted throughout the study period.

Because students were more often scheduled to dial during day hours, they were more likely to purge the sample of business and non-working numbers and therefore, did not have as many opportunities to contact an eligible respondent. The fact that students had more non-answered calls than professionals perhaps reflects this difference in scheduling times.

Of course, selection factors created differences in performance since professionals were chosen on their abilities, for the most part, known prior to the start of the project. Students, on the other hand, were self-selected into the project because of their willingness to participate or to be trained as interviewers and their interest in the course in general.

Other projects that must employ inexperienced interviewers would be well advised to add to their interviewer training techniques in overcoming objections. In addition to practical training performed on the questionnaire itself, skill in introducing the survey should be strongly emphasized. New interviewers should be facile at providing persuasive arguments and supporting information, if needed, about why respondents should give up their time in the name of science. These justifying arguments should then be practiced so they become automatic and personable. Perhaps with this type of

background training, novice and experienced interviewers would have more similar rates of response.

Impact of New Technology on Response Rates

For this project CATI was programmed to allow a separate code or “answering machine" to distinguish it from no-answer outcome dispositions. After interviewers determined whether the message on the machine indicated whether the call was to a residence or business, they were instructed to hang up, leaving no message. They were told to then enter the outcome as "answering machine" (unless the message indicated a business).

Considering all 17,988 dialings that were made, 627 answering machine dispositions were coded, representing over 3 percent of all attempts. Out of 2,664 households that were contacted, 240 of them had answering machines on at least one contact, or 9 percent of all households. These types of outcomes were processed over several time periods per day, and on different days of the week. This percentage may under represent the actual number of answering machines in households because lower income areas were oversampled for this project. Each of the 144 answering machine dispositions produced on the first attempt were called an average of 5.8 times, the largest number of attempts made to any single, initial outcome disposition. However, after the first attempt, subsequent contacts produced only 30 completed interviews. If all attempts to contact these residents had failed to produce a human response of any kind, the case was finalized as "answering machine." From out of the 144 answering-machine first contact dispositions, 26 percent or 37 cases has to be finalized in this way. An additional 22 cases (with "no answer" initial out- comes) were eventually finalized as "answering machine," a total of 59 cases, because attempts to reach these households resulted in either no-answer or answering-machine outcomes for the duration of the calling period.

The average age of the respondents that were eventually reached from the answering-machine group was 33 years, with a mode of 30. Households with machines had an average of two members, with a mode of one. Sixty-three percent of these respondents were male. The racial backgrounds for this group were 73 percent white, 7 percent Hispanic and 7 percent Asian (the remaining 13 percent of this group declined to report their race). The income level for these respondents was quite high, with 57 percent earning over $30,000 per year, 33 percent earning below that amount and 10 percent refusing to disclose this information (in comparison to a mode of $10-20,000 for the entire sample).

It is difficult to say whether or not people with answering machines are really not at home or are simply screening their calls. To the extent that they were home, making use of an "electronic secretary," determines how response rates were affected. It could be that similar individuals would not have been reached in studies of past years and would have been coded "no answer," or that more would have been reached since they could not screen their calls.

Another technological advancement in telecommunications that has introduced some difficulties for telephone interviewing is the "call-waiting" feature of current phone service. This is the type of service that allows one call to be interrupted by another incoming call through a series of clicking sounds. The current conversation can then be put on hold while the second caller is spoken with. It is the equivalent of having two phone lines on the same telephone.

It is not possible to determine how much response rates were affected because the informant was on another call when the interviewer made contact. This situation is probably preferable to a busy signal because it at least allows a determination to be made regarding household status. But much more problematic and frustrating were the disrupted interviews. There were

approximately 32 such interruptions when the questionnaire was being administered that could not be recontacted for completion before the end of the study. Once an interview was stopped because of an incoming call, it was very difficult to complete the case because either the respondent was reluctant to invest more time or the respondent was not available when the callback was made.

Another technological issue that interviewers faced were new uses for telephone lines. Unfamiliar high-pitched tones sometimes followed a normal ring cycle. These turned out to be contact numbers for computers. In addition, interviewers encountered several car phones that were answered by very cooperative, but ineligible, cellular phone owners. While these two examples represent very infrequent occurrences in this study, they serve to illustrate that more and more phone numbers are being utilized in non-traditional ways. Perhaps this is of concern to unique sub-populations of the United States but probably applies somewhat to all metropolitan areas.

If sizable numbers of consumers make use of new machines, especially to protect their privacy, telephone surveys will have some problems with non-response particularly of upper- and upper-middle class people in the young adult age range.

CONCLUSION

The critical statistic in terms of the generalizability of the findings of this study would seem to be the refusal rate. As reported, 36 percent of all households contacted resulted in an inconvertible refusal to participate (although many of these households were never recontacted for a refusal conversion attempt). This is somewhat more than refusal rates typically reported for similar telephone surveys (about 20 percent), but notably higher than the 5 percent or so typical of face-to-face surveys (see Thornberry and Poe 1982). This refusal rate discrepancy seems to be a rather consistent problem, and perhaps the most serious, for telephone researchers.

Specific recommendations on this problem do not emerge from this study except to point out that 96 percent of all first-attempt refusals occurred in the introductory phase of the questionnaire prior to the selection of a respondent. Face-to-face interviewers have known for some time the importance of getting one's "foot in the door," and it seems telephone interviewers would do well to heed this principle. The necessity for interviewers to be facile and persuasive in introducing the survey cannot be overemphasized. Techniques in teaching this skill as well as specific types of introductions and appeals would be worthy foci of future research.

As noted previously, follow-up calling proved to be highly effective. Over 79 percent of all completed interviews came on a follow-up call (i.e., required more than one attempt). In fact, follow-up calls converted 12 percent of all previous refusals to completed interviews. We also noted that although we invested a relatively great amount of time into scheduling detailed call-backs for known households (almost six minutes), non-household numbers could be recorded and purged quite rapidly (less than two minutes). Still, there is presumably a point of diminishing returns for follow-up calling which is largely contingent upon the particular priorities of the individual study. Our results for household numbers concur with Groves and Kahn (1979) in that over half were finalized within three follow-up calls. But, in the end, almost 30 percent of all completes required more than three calls. Again, however, given the relativity of the importance of such statistics for evaluating different projects, a rather comprehensive, empirically generated table of the expected outcomes for various follow-up calling cut-off rules would seem the only appropriate generic guide. Our Table 3 is intended to be a step in this direction.

Another informative aspect of this study was the comparison between student and professional interviewers. We draw only tentative conclusions from the data here since student-versus-professional interviewer statistics were confounded with time and day of shift, and since there were so few professionals relative to students. However, our logit analyses oblige us to take serious note of the higher refusal rate among student interviewers. Compared to professionals, students seemed to encounter the greatest difficulty in "winning over" the respondent or informant in the introductory phase of the interview; but once into the actual questionnaire items, student-professional differences were greatly diminished. These results are in line with supervisor evaluations that reported adequate to excellent interviewing technique for nearly every student, but some trepidation, relative to most professionals, with assertive refusers. This seems to echo our earlier emphasis on training interviewers to introduce the survey in a highly persuasive manner.

Finally, under the heading of "New Technology" we discussed the impact of answering machines, call-waiting service, computer lines, and car phones. Only the prevalence of answering machines seemed to be of serious concern in this study, but these developments (each presumably in their infancy) are likely indicative of the increasingly diverse set of outcomes with which researchers will have to contend. And, in regard to answering machines, it seems incumbent upon us to recognize that their prevalence may in part be due to the inundation of telemarketing and telephone surveys and that these machines are being used to "screen out" just such calls. Even with our over- sampling of low-income areas we discovered nearly one in every ten households had an answering machine, and these potential respondents were very hard to contact indeed. About one-fourth were, in fact, eventually finalized simply as "answering machine." Conceivably, this problem could become quite serious for researchers trying to conduct surveys by telephone.

No doubt, the use of the telephone survey is growing by leaps and bounds, and its acceptance as a legitimate data-generating device appears to be increasing as well. Yet greater coordination of effort and information exchange would seem necessary for this to become a truly progressive methodology. It appears survey researchers are often forced to make critical procedural decisions based on intuition and "rules of thumb" when the data exists, but is poorly disseminated, to provide much more precise guidance. This may frequently result in an inefficient use of resources and perhaps negatively affects the quality of research. Reports of response rates for different geographic areas and the effectiveness of follow-up calling can be invaluable in designing future studies. (Although we are, of course, in no way suggesting that this should preclude scientific replication or the challenging of previous research.)

More coordinated effort in this way is especially important as the true limits of our resource--a cooperative public--may soon be realized. We cannot afford to exhaust our data source, particularly with its newly acquired ability to rebuff us completely (i.e., via answering machines). Our emphasis on persuading respondents to participate must be balanced against the danger of alienating the public. Thus, public relations should assume a top priority in all telephone research, lest we go the way of the dinosaur.

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