Gaining Efficiencies in Scheduling Callbacks in Large RDD National Surveys

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Introduction

Survey researchers often utilize a set of guidelines (or rules) that dictate how and when a sample unit should be contacted during the survey's field period. In telephone surveys, these "calling rules" are typically customized to the particular organization and to the particular survey, and often are linked to the cost a client is willing to pay. When conducting reoccurring random digit dialing (RDD) surveys, calling rules should be examined periodically to seek new efficiencies in response rates and/or survey costs.

These calling rules are a primary mechanism that researchers have to affect a survey's response rate. All things equal, making more dialing attempts over a greater number of days will lower noncontact-related nonresponse thereby yielding a higher response rate. This is true for many reasons, but, in particular, it follows from the general logic that the more dialings placed to a telephone number the more likely someone will eventually answer it, thereby giving the survey organization's interviewers the opportunity to try to complete an interview. However, experience also shows that for certain hard-to-reach households extensive calling can be counterproductive – e.g., ones with Caller ID or Privacy Manager that see the same in-coming number trying to reach them over and over and over again – and that fewer "strategically placed" call attempts may yield greater success. Thus, this simple example highlights the complexity required in devising efficient calling rules targeted at individual numbers/households.

All surveys have finite budgets and resources that must be allocated for dialing attempts, including interviewer-related expenditures linked to dialing attempts. Resources allocated for these purposes cannot be allocated for other important purposes, such as additional questionnaire testing/development or larger sample sizes. To the extend that calling rules can be identified that lead to no decrement in survey quality, but do lead to a lowering of the total resources needed to dial the sampling pool, then a win-win situation results for the researchers (and funders). Along these lines, the ultimate goal of this part of the survey enterprise is to identify operationally practical heuristic mechanisms that can target the dialing attempts – the number of attempts, the times of day, and days of the week attempts are made – to the needs of the individual telephone number.

Past Literature

Prior studies investigating telephone survey calling rules in surveys of the general population have found, or suggested, that efficiencies may be gained through "optimizing" calling rules. Much of the literature discusses which days of the week and which times of the day to call sample units. Weekday evenings and weekends have consistently been found to have the best contact rates, whereas weekday daytime hours are least productive in terms of contact. Increasing the amount of time between dialing attempts (also known as "lag-time") has been found to be beneficial, providing the filed period makes this feasible. (Weeks, Kulka, & Pierson, 1987; Massey, Wolter, Wan, & Liu, 1996; and Odom & Kalsbeek, 2000).

Deciding how many times to call back a sample unit has significant time and cost implications for a survey. Harpuder and Stec (1999) studied the optimum number of callbacks in a monthly statewide RDD survey and concluded that 6-7 callbacks to a sample unit were most efficient. They noted that the number of callbacks logically would vary by organization and study.

Calling rules also have been developed that concentrate on reducing nonresponse via refusal conversion efforts (Ahmed & Kalsbeek, 1998; Stec, Lavrakas, & Stasny, 1999; and Odom & Kalsbeek, 2000).

Using regression analysis with existing survey datasets allows the researcher to model calling rules based on, and controlling for, known characteristics of a sample unit. Reedman and Robinson (1997) developed a regression-based prioritization system that scheduled sample units more likely to result in a completed survey at optimal times. Regression models also can be utilized for predicting optimal times of the day or days of the week to place callbacks (Stokes and Greenberg, 1990).

The Purpose of This Paper

It is within this vein of research that the authors of this paper have sought to analyze calling rules particular Nielsen Media Research (NMR). Each year NMR uses a list-assisted RDD frame to sample respondent households for its U.S. national mixed mode diary surveys of television viewing in the United States. In particular, four times each year (January/February, March/April, June/July, and October/November) NMR conducts a survey of television viewing that begins with a RDD stage. The frame used is all possible 100-banks of telephone number area code/prefix/suffix combinations with at least one listed telephone number within the bank. This is done in the 50 states. In each of these surveys upwards of 1,200,000 RDD telephone numbers are randomly split into four replicates; collectively the four replicates are used for the survey's sampling pool. NMR follows fixed calling rules, which distribute as many as 15 call attempts per telephone number over a 14-16 day field period. Callbacks are spaced across different days of the week and times of day. This effort leads to far better than average response rates compared to most other commercial survey efforts. For example, the Oct/Nov 2003 survey achieved an AAPOR Response Rate 1 of 43% and an AAPOR Response Rate 3 of 47%.

This paper will present analyses using NMR's 2003 and 2004 calling data to investigate where efficiencies are likely to be gained by changing the fixed calling rules NMR now uses to more flexible calling rules. Our investigation

[1] The views expressed in this paper are those of the authors and do not necessarily reflect the views of other CRA staff.

will cover 1) optimal number of dialing attempts, 2) limiting dialing attempts to certain "nonproductive" numbers (e.g., continuously busy, large number of no answers, etc.), 3) a prioritization system for likely productive numbers, and 4) optimal calling times.

Methods

The data used for this study come from NMR call history data ("call data") from the July 2003, November

The total number of sampled phone numbers for these four sweeps periods was 4,335,186. Of these telephone numbers, the number of eligible households was 2,452,522. These eligible households were called 19,286,241 for an average number of calls per eligible household of almost 8 call attempts.

Through the course of interviewing, disposition codes corresponding to the outcome of each call are assigned to each case by interviewers. The system used by NMR records not only the disposition code for each call, but also records the date and time. This information is used to generate a complete call history for a given case. That call history includes the time elapsed between successive calls to a given number, the number of calls made to a given case, and how many calls were made on a given case that were 1) busy signals, 2) no answer – answering machine, 3) non answer – answering service, 4) no answer, 5) callbacks, 6) nuisance calls, 7) refusals, and 8) refusal callbacks. Additional variables created from a call's history also include the outcome of the current call and the outcome of the previous call.

For the purposes of this study, contacts are defined as any call in which a member of the household was reached. That includes a refusal, a callback, a completed interview, or other household contact (a nuisance call, an out of sample call, an other foreign language call, a special operator 1 call, a special operator 3 call, away during calling or diary week call, an irate call, or an extenuating circumstances call). A non-contact, but still a potentially eligible number, is defined as a busy signal, an unanswered number,[2] or other non-contact (place of business – data phone signal, out of order, bad rings, or callback – can't complete as dialed).

Lastly, an ineligible number is defined as a not in service number, a temporarily disconnected number, a permanently disconnected number, a non-published number, a number changed, a beeper phone number, a non-residential number – business, a respondent volunteered media related/employed number, an out of sample – group housing number, an out of sample – vacation/second home number, an indicates no TV at the beginning of interview number, or a cell phone number. In this study, ineligible numbers were removed. Since the goal here is to develop an efficient system of calling random digit dialed (RDD) telephone numbers that will generate contacts and completed interviews with respondents in the fewest calls, ineligible numbers were considered to be irrelevant to the analysis.

[2] An unanswered number is a no answer – answering machine, a no answer – answering service, and a no answer. All three types of no answers calls are accounted for separately in these analyses.

2003, February 2004, and May 2004 sweeps periods. The call data represent NMR's attempts to reach eligible households to ask for their participation in NMR's Diary Placement. The diary placement is the method by which NMR collects the television viewing data in 210 local television market areas in the U.S. NMR releases sample for a sweeps period in four roughly equal increments. The entire sample for all four sweeps periods is the data examined here.

Research Results – Univariate Analyses

1. First Calls Made to a Household

NMR currently makes many of its first calls on weekends. While weekends make it more likely that contact will be made with a working household, it is harder to determine small business numbers, which may be closed on weekends. The next section attempts to determine what is the most effective and practical strategy for making first calls.

a. First Calls Examined Across Time of Day and Day of Week

Table 1 presents the first outcomes for all the sweeps periods broken out by time of day and day of week.[3] Not surprisingly, making contact with a household is more likely during the evening hours than it is during the morning and afternoon hours. Similarly, it is more likely to reach a household's answering machine or to receive a no answer outcome during the morning or afternoon compared to the evening. It is no more likely to encounter a non-working number for any particular time period.

NMR typically releases a new week of sample during a sweeps period on a Saturday. This is to maximize the number of first call attempts that result in completions since it is more likely someone from the average household is home during the weekend as opposed to during the week. Due to this policy, there are not many first call attempts that are undertaken on Thursdays; therefore, any conclusions that are drawn from Table 1 for that day must be made with caution. As one might expect, the percentage of completions and refusals for Saturdays and Sundays are higher than for weekdays. Interestingly, Thursdays also have a higher rate of completions and refusals. Monday, Thursday, Saturday, and Sunday nights are the very best days and times for both contacts and completions. There is a large drop off of contact and completion rates for first calls made on Monday through Wednesday, as well as Friday, mornings and afternoons.

b. First Calls Examined Across Time Zone

The time zone of the household that is being called is also information that is available prior to the first call.

[3] NMR currently defines its "day parts" as morning (9 a.m.-11:59 a.m.), afternoon (12:00 p.m. – 5:59 p.m.) and evening (6:00 p.m. – 12:00 a.m.). Through discussions with NMR personnel, there were indications that breaking up the afternoon day part into early and late afternoon day parts would be useful.

NMR called the Eastern, Central, Mountain, Pacific, Alaskan, and Hawaiian time zones during the July 2003, November 2003, February 2004, and May 2004 sweeps periods. The percentages of contacts and completions do not differ much across time zones, indicating that differentiating phone numbers by the time zone in which they are in will not prove very fruitful.

2. Calls Made After the First Call

While first calls and when they are made are important, the majority of calls made by NMR are subsequent calls.[4] For these calls, a call history is available for each phone number. This section examines each of the available call history variables, as well as variables available to first calls, to determine recommendations that NMR can implement in its current calling systems.

a. Number of Call Attempts

NMR's current policy of calling households is to resolve a case after the fifteenth call attempt, unless the case resolves itself before then or the case has experienced one or more busy signals. Figure 1 presents the likelihood that the n^{th} call attempt will lead to a contact, where a contact is defined as above. There is a steady drop off, as one might expect, as more calls are attempted for a given case. Based on the data from all the sweeps period, there is approximately 1.0% less chance for the next phone call to lead to a contact. For example, there is about an 8% chance that the 12^{th} phone call made on a case will lead to a contact. That percentage falls by roughly 1.0% point, to about 7%, if a 13^{th} phone call is attempted.

Figure 2 explores the likelihood of each call attempt leading to a completion. As one would expect, the likelihood that a call attempt leads to a completion is less than the likelihood of a contact. Overall, the percentage of completions from all calls made to numbers that are thought to be eligible declines from a high of 13% on the first call to a low of 0% at phone numbers called for the 30^{th} time. In fact, of the over 794,000 calls (4.1% of the total number of calls) made to phone numbers for the 20^{th} or more times only an additional 495 completions (0.05% of the total number of completions) were achieved. Essentially, 99.26% of the completions that NMR achieves are finished before the 15^{th} call. But, even after 10 call attempts, over 93% of the completions that NMR will finish have already been achieved. Based on this analysis of call attempts, it is clear that there is a point of diminishing returns to additional call attempts. The crucial question is: what is the call number where it does not make financial sense to make additional calls.

If an extrapolation from the calls prior to 16^{th} or more calls is done, it appears that the contact rate would level off at approximately 7-9% and the completion rate would level off at approximately 2%. But, a good argument could be made for reducing the maximum number of calls to be less than 15 call attempts. In fact, in some cases, there is evidence that fewer than 10 call attempts should be made to certain phone numbers. But, to make these types of recommendations, the call history for a given phone number must be taken into account.

b. Call History

The analysis from the previous section can be defined even further to examine what was a given case's call history up to the current call attempt. For example, if a phone number had already had 5 busy signals as prior outcomes, what is the likelihood that the sixth call attempt would lead to a contact or completion? Figure 3 illustrates the answer to this question. It indicates that the likelihood that after five or six busy signals the subsequent call will lead to a contact is very small. After 10 busy signals, for example, the likelihood that the 10^{th} call will lead to a contact is less than 1%. This would indicate that there is certainly very little to be gained by calling phone numbers in which there have been more than 10 busy signals.

Figure 4 has the likelihood of the next call leading to a completion after a given number of prior busy signals. After five busy signals, the likelihood of the next call leading to a completion is less than 1%. This would indicate that there is certainly very little to be gained by continuing to call phone numbers having five busy signals.

Another call outcome that occurs often is a "no answer – answering machine" (NA-AM) outcome. It is apparent that the likelihood of the next call leading to a contact (and completion) is higher for phone numbers with prior NA-AM outcomes than with prior busy outcomes. Moreover, the likelihood of contact or completion on the next call does not decline precipitously with prior NA-AM outcomes as it does for prior busy outcomes.

For contacts, the likelihood of the next call being a contact does not dip below 10%. For completions, the likelihood of the next call being a completion does not dip below 2%. In fact, it could be argued that it would be more efficient to call phone numbers that had up to fourteen prior NA-AM outcomes before calling a phone number that had just two prior busies, *ceteris paribus*, because it is more likely that the next call would lead to a contact or a completion than a call to a phone number that had only two prior busy outcomes.[5]

Many households do not have answering machines, so it is important to examine call histories where "no answer" (NA) outcomes occur. Prior NA outcomes lead to a contact curve that is between what was observed for prior busy outcomes and for prior NA-AM outcomes. The same is true of the curve representing completions for each of these three categories of outcomes. In terms of the likelihood of making contacts or completions after a given number of prior outcomes, prior NA-AM outcomes are most likely to lead to contacts and completions, NA outcomes are next on the list, and busy outcomes are last on the list.

The last prior outcome that occurs frequently is callback outcomes. Unlike busy, NA-AM, and NA

[4] Approximately 87% of the calls that NMR makes to eligible households are calls after the first call.

[5] The same holds true when examining completions, namely it would lead to more completions if phone numbers with up to six prior NA-AM outcomes were called before phone numbers that had just two prior busy outcomes.

outcomes, the more prior callbacks that have occurred, the more likely it is that a subsequent call will lead to a contact. Intuitively, this makes sense because often specific appointments for callbacks are set and each subsequent call leads to a contact at the specified appointment time.[6]

For completions, the likelihood of a subsequent call leading to a completion stays roughly the same as more callbacks occur. The likelihood stays above 4% through the 11th prior callback attempt, and dips considerably after that. In terms of a ranking with the other call outcomes, a callback ranks higher than NA-AM, AM, and busy outcomes when comparing call attempt to call attempt. Given these results reflected above, it would be more efficient to continue to process phone numbers that have callbacks and NA-AM call histories for 12 to 14 calls than phone numbers with as little as two busies or two NA outcomes in their call histories. In fact, given the very low likelihood that phone numbers with more than five busies or more than five NA outcomes have of leading to a contact or completion, it would be reasonable to stop processing these cases after they reach five busy or five NA outcomes.

c. Time Elapsed Between Calls

Another factor that could affect whether a call attempt leads to a contact or completions is the time that has elapsed since a prior call had been made to the phone number. Breaking up the time that elapsed between call attempts into 12-hour increments, we examined the likelihood of contacting a household as the time elapsed since the last call to the household increases.

The likelihood of contacting a household increases up to calls separated by about 3 days. Then the likelihood of contacting a household remains flat. This indicates that a call made about 3 days after the previous call has the best chance of leading to a contact. We found similar results for completions, namely, calls made about 3 days after the previous call are the ones most likely to lead to completions. In the case of completions, the likelihood of a completion remains at about the same level from calls made three to seven days after the previous call. This leaves a relatively large window to make a follow up call while still taking advantage of the most likely time to make the follow up call.

d. Previous Outcome

Another factor is whether the outcome of an unsuccessful attempt to a number is a good predictor of the success rate of the next call to the number. There is a wide range of contact and completion percentages across previous outcomes. Consequently, holding all else equal, differential effort should be given to previous outcomes where callbacks and refusals occurred before focusing on any other previous outcomes. In fact, we see the same pattern here as in the examination of call histories in that callbacks, NA-AM, along with refusals have the highest likelihood of leading to contacts and completions. NA's and busies take about the same lower priority. There are also certain dispositions that are pursued when there is little chance that a contact or completion will result from these efforts. Specifically, recalling a phone number that has as its previous outcome a business or dial problem disposition leads to a contact or completion a small percentage of the time. Therefore, it would be an inefficient use of resources to pursue these types of phone numbers past the initial business or dial problem disposition.

e. Day of the Week and Time of the Day Effects

We should expect that the incidence of contacts and completions should be influenced by when a call is made. In fact, evidence of that was presented in the examination of first call attempts above. Here we look at all call attempts, when those attempts are made, and the likelihood that the attempts lead to contacts and completions.

Interestingly, call attempts made on a Monday have the most likely chance of reaching a household, *ceteris paribus*. As expected, Saturdays and Sundays also lead to higher likelihood that a household will be contacted. For completions, both calls made at the beginning and end of the week are more likely to lead to a completion than calls made during the week. This further suggests that calls made on Saturday, Sunday, Monday, Tuesday, and Wednesday are the ones that are most likely to lead to completions.

For day partitions (day parts), intuition would suggest that the best time to reach a household, *ceteris paribus*, would be in the evening. The data bears this intuition out. It is apparent that, during the evening, the likelihood of contacting a household is much higher than any other day part. The same holds true for completing an interview.

Research Results – Multivariate Analyses

All of the analyses above assume that other factors that might influence whether the next call attempt leads to contact or completion are held constant. This is an unrealistic assumption because certainly all these factors work together to determine which next calls have the highest likelihood of contacting a household or resulting in a completion. By controlling for the components of a phone number's history, conclusions can be made as to the relative importance of each component in determining whether a contact or completion will occur on the next phone call. Moreover, taking the components together, the probability of the next call leading to a contact or completion can be calculated. These probabilities can be ordered from highest to lowest to rank the phone numbers that should be called before other lower probability phone calls are attempted. These probabilities will be referred to as "priority scores" with higher priority scores indicating that those phone numbers should be called before phone numbers with lower priority scores.

Therefore, we now examine the effects of all the explanatory variables together on the probability of a contact and completion. The explanatory variables under consideration are whether the phone number is part of additional sample, the number of attempts made to contact the household, the time elapsed between the current call and the last call made, the shift on which the current call is

[6] There are only 19 and 4 cases that have callbacks through 12 and 13 calls, respectively. Thus, the graph for the 12th and 13th attempts can be misleading.

made, the call history of the case, the type of phone number, the time zone the respondent is in, and the day of the week the call is made. The call history of the case is broken down into the number of previous busies, the number of previous no answer – answering machines, the number of previous no answer – answering service, the number of no answers, the number of callbacks, and the number of refusals.

The variable to be explained is whether a successful outcome (contact or completion) is reached on a given call attempt. This dependent variable can naturally be understood as a success/no success dichotomous variable. We adopt the logistic distribution to model this dichotomous variable.

3. First Calls Made to a Household

First, we examine the contact and completion outcomes made on the first call to a phone number. The only explanatory variables that exist for first calls are the time and the day the first call was made. Since there is no call history when the first call is made, there are no data for any of the call history explanatory variables. Given our univariate findings above, we expect that the estimated probability of a successful contact will be higher if the first call is made during the evening than if it is made during the day. We also expect that weekend calls will lead to successful contacts more often than weekday calls. Table 2 indicates that contacts are more likely if calls are made on Saturdays and Sundays. Other days are less likely to lead to first call contacts. It is also the case that the latest day part is the best time to make calls. For completions, they are most likely to occur with first calls made on Saturdays and Sundays in later day parts. Mondays, Tuesdays, and Wednesdays continue to be relatively poor days to make first calls.

4. Calls Made After the First Call

This section examines calls made after the first call. This allows us to enter a number of call history variables that are not available for first calls. The explanatory variables under consideration are the number of attempts made to contact the household, the time elapsed between the current call and the last call made, the shift on which the current call is made, the call history of the case, the time zone the respondent is in, and the day of the week the call is made. The call history of the case is broken down into the number of previous busies, the number of previous no answer – answering machines, the number of previous no answer – answering service, the number of no answers, the number of callbacks, and the number of refusals.

Table 3 presents the likelihood of a contact as a function of all the independent variables listed above. The findings here indicate that previous callbacks are the types of previous calls that most positively affect whether the next call leads to a contact. Intuitively, this makes sense since a previous call has already determined that the phone number is a valid household. When a call is made also influences strongly whether a contact will result. Evening calls are most likely to lead to a contact with late afternoon calls not far behind. In addition, Saturday, Sunday, and Monday calls are the most likely to lead to a contact. For completions, Table 4 displays the various relationships between the dependent variable and independent variables. The findings here indicate that previous callbacks are the types of previous calls that most positively affect whether the next call leads to a completion. Intuitively, this makes sense since a previous call has already determined that the phone number is a valid household. When a call is made also influences strongly whether a completion will result. Evening calls are most likely to lead to a completion with late afternoon calls not far behind. In addition, Saturday, Sunday, and Monday calls are the most likely to lead to a completion. What most negatively influences the likelihood of a contact or completion is the number of calls made.

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Table 1: Percentage of Contacts and Completions on First Calls by Time of Day and Day of Week for All Sweeps Periods

	Morning Day Part		Early Afternoon Day Part		Late Afternoon Day Part		Evening Day Part	
	Contact	Completion	Contact	Completion	Contact	Completion	Contact	Completion
Monday	23.3% 132,063	9.0% 132,063	22.4% 109,578	8.5% 109,578	26.8% 60,419	10.2% 60,419	44.1% 61,706	18.2% 61,706
Tuesday	21.5% 58,806	7.7% 58,806	23.5% 44,303	8.7% 44,303	26.5% 49,047	10.6% 49,047	32.9% 34,382	13.2% 34,382
Wednesday	21.4% 29,388	7.7% 29,388	21.8% 25,721	8.0% 25,721	26.4% 17,528	10.0% 17,528	40.3% 18,512	15.1% 18,512
Thursday	27.6% 14,478	10.7% 14,478	25.1% 10,137	8.5% 10,137	26.0% 6,463	8.3% 6,463	44.3% 9,500	17.7% 9,500
Friday	20.0% 195,806	6.6% 195,806	19.4% 160,885	6.3% 160,885	21.6% 133,767	7.0% 133,767	27.1% 82,640	8.8% 82,640
Saturday	39.7% 163,994	17.3% 163,994	35.9% 157,221	15.7% 157,221	37.0% 139,457	16.0% 139,457	41.6% 222,965	18.0% 222,965
Sunday	39.7% 91,295	16.8% 91,295	38.6% 109,912	17.1% 109,912	40.8% 116,299	18.3% 116,299	45.7% 196,248	19.6% 196,248

Figure 1: Likelihood of Contact by Call Attempt (All Sweeps Periods)

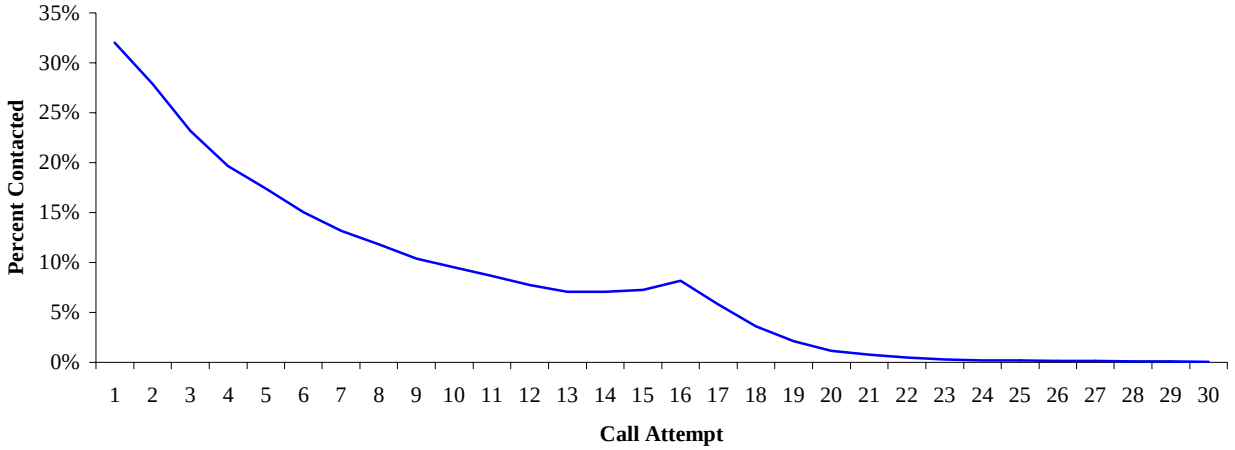

Figure 2: Likelihood of Completion by Call Attempt (All Sweeps Periods)

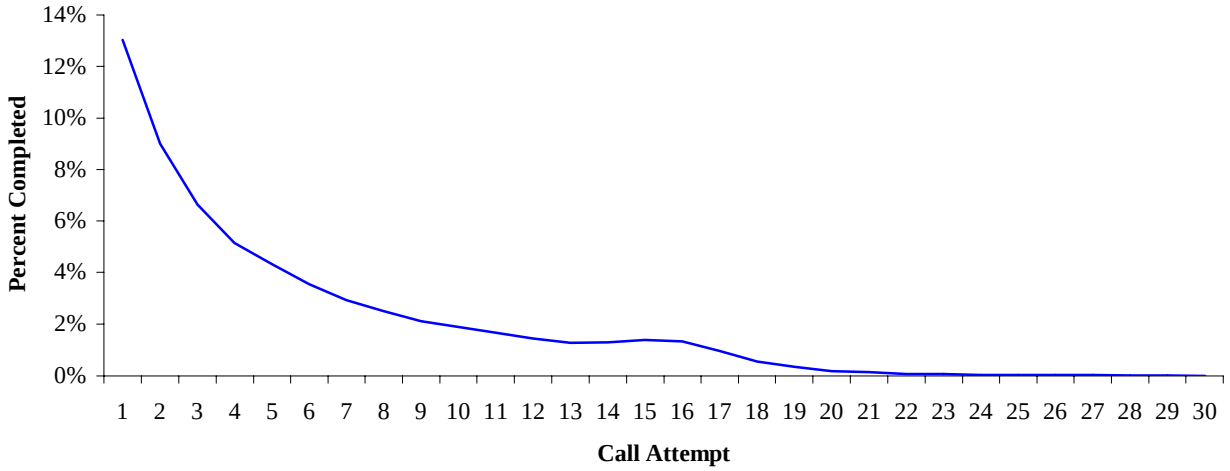

Figure 3: Likelihood of Contacting a Household after a Given Number of Outcomes (All Sweeps Periods)

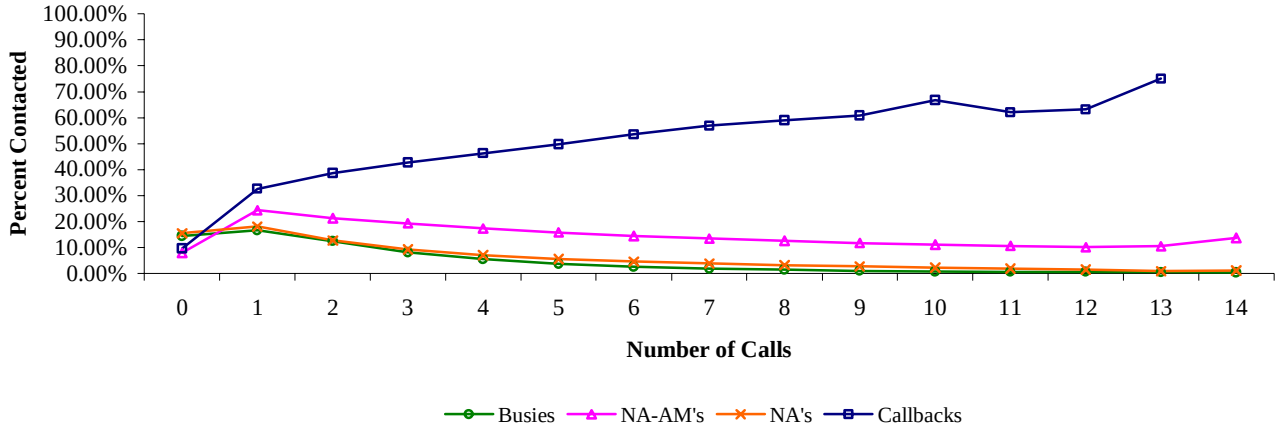

Figure 4: Likelihood of Completing a Survey after a Given Number of Outcomes (All Sweeps Periods)

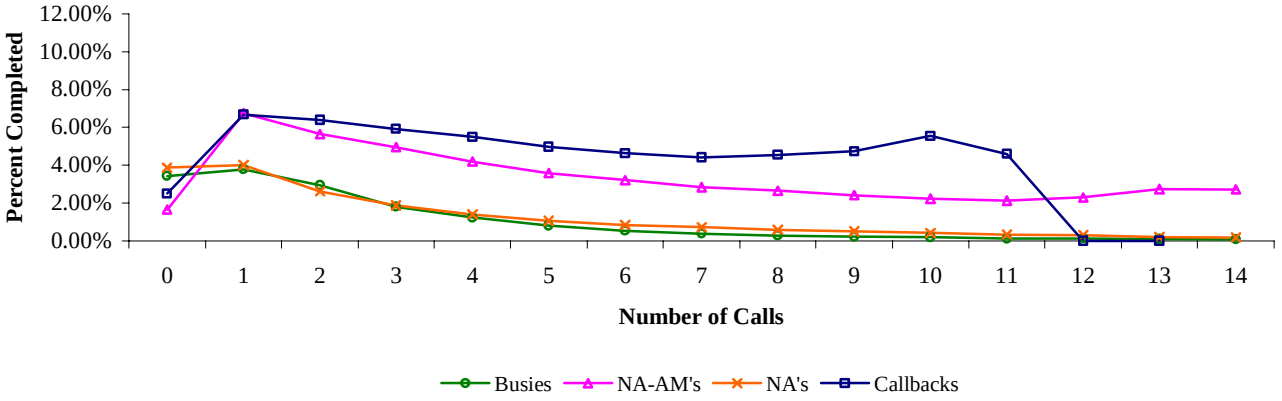

Table 2: Coefficients from Logistic Regressions (First Calls)		
Variable	Contacts	Completions
	Coefficient (Standard Error)	Coefficient (Standard Error)
Time Call Was Made (4 Day Parts)	0.121* (0.001)	0.093* (0.002)
Monday	-0.586* (0.005)	-0.573* (0.007)
Tuesday	-0.699* (0.006)	-0.686* (0.009)
Wednesday	-0.645* (0.008)	-0.681* (0.012)
Thursday	-0.432* (0.011)	-0.500 * (0.016)
Friday	-0.918* (0.004)	-1.040 * (0.006)
Saturday	-0.107* (0.004)	-0.074* (0.005)
Constant	-1.665* (0.005)	-1.765* (0.006)
*Indicates the parameter estimate is significant with at least 95% confidence.		

Table 3: Logistic Regression for Contacts (Calls 2-30)								
	July 2003		November 2003		February 2004		May 2004	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
CALLNUM	0.1977*	0.0023	0.0195*	0.0013	0.0034*	0.0012	0.0088*	0.0012
LASTTIME	0.0097*	8.06E-05	0.0030*	4.57E-05	0.0007*	4.12E-05	0.0066*	5.78E-05
TIMECAT	0.1551*	0.0017	0.2633*	0.0014	0.2597*	0.0014	0.2379*	0.0013
BUSY	-0.4451*	0.0027	-0.3137*	0.0018	-0.2882*	0.0016	-0.2693*	0.0015
NAAM	-0.3100*	0.0024	-0.1450*	0.0014	-0.1255*	0.0013	-0.1046*	0.0013
NAAS	-0.3289*	0.0190	-0.3108*	0.0149	-0.1477*	0.0111	-0.1828*	0.0109
NA	-0.4711*	0.0024	-0.3191*	0.0014	-0.3070*	0.0014	-0.2668*	0.0013
CBACK	0.4495*	0.0034	0.5642*	0.0024	0.5392*	0.0023	0.5344*	0.0022
EAST	0.0167*	0.0062	0.0886*	0.0049	0.1190*	0.0050	0.0484*	0.0048
MOUNT	0.0534*	0.0091	0.0414*	0.0075	0.0690*	0.0078	0.0527*	0.0073
CENTRAL	0.0747*	0.0063	0.1213*	0.0050	0.1414*	0.0051	0.1058*	0.0049
MONDAY	-0.3162*	0.0073	-0.2879*	0.0060	-0.3570*	0.0067	-0.2375*	0.0064
TUESDAY	-0.3818*	0.0074	-0.4620*	0.0060	-0.5139*	0.0066	-0.4044*	0.0064
WEDNESDAY	-0.4449*	0.0076	-0.4434*	0.0061	-0.5230*	0.0065	-0.4462*	0.0063
THURSDAY	-0.5368*	0.0073	-0.4444*	0.0061	-0.6034*	0.0065	-0.4940*	0.0066
FRIDAY	-0.3746*	0.0078	-0.5381*	0.0059	-0.5311*	0.0070	-0.4744*	0.0066
SATURDAY	-0.0693*	0.0076	-0.0315*	0.0057	0.0359*	0.0066	-0.0329*	0.0067
Constant	-2.0085*	0.0110	-1.4920*	0.0091	-1.3094*	0.0097	-1.5973*	0.0084
*Indicates the parameter estimate is significant with at least 95% confidence.								

Table 4: Logistic Regression for Completions (Calls 2-30)								
	July 2003		November 2003		February 2004		May 2004	
Variable	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
CALLNUM	-0.2296*	0.0054	-0.2245*	0.0036	-0.1932*	0.0032	-0.1769*	0.0030
LASTTIME	0.0055*	0.0001	0.0019*	0.0001	-0.0003*	0.0001	0.0014*	0.0001
TIMECAT	0.1894*	0.0027	0.2544*	0.0026	0.2419*	0.0026	0.2166*	0.0025
BUSY	-0.0423*	0.0059	-0.0774*	0.0043	-0.1017*	0.0038	-0.1029*	0.0036
NAAM	0.1118*	0.0055	0.0929*	0.0037	0.0617*	0.0034	0.0787*	0.0031
NAAS	0.0917*	0.0327	0.1136*	0.0282	-0.0124*	0.0229	0.0613*	0.0211
NA	-0.0980*	0.0055	-0.1138*	0.0038	-0.1560*	0.0035	-0.1183*	0.0032
CBACK	0.4766*	0.0066	0.4200*	0.0048	0.3516*	0.0045	0.3564*	0.0043
EAST	0.1717*	0.0102	0.2260*	0.0093	0.2457*	0.0095	0.1960*	0.0091
MOUNT	0.2040*	0.0145	0.2091*	0.0136	0.2258*	0.0140	0.2159*	0.0133
CENTRAL	0.2637*	0.0103	0.2616*	0.0094	0.2914*	0.0097	0.2818*	0.0092
MONDAY	-0.1932*	0.0111	-0.1889*	0.0113	-0.1913*	0.0114	-0.0511*	0.0112
TUESDAY	-0.3433*	0.0114	-0.3263*	0.0109	-0.4197*	0.0117	-0.2780*	0.0113
WEDNESDAY	-0.4096*	0.0118	-0.2914*	0.0110	-0.4200*	0.0116	-0.4047*	0.0114
THURSDAY	-0.4986*	0.0116	-0.3697*	0.0113	-0.5557*	0.0121	-0.4955*	0.0125
FRIDAY	-0.4195*	0.0124	-0.4019*	0.0109	-0.5441*	0.0130	-0.5290*	0.0121
SATURDAY	-0.1219*	0.0124	-0.0627*	0.0108	-0.0890*	0.0123	-0.0921*	0.0123
Constant	-2.6223*	0.0181	-2.7807*	0.0174	-2.5667*	0.0179	-2.7575*	0.0157
*Indicates the parameter estimate is significant with at least 95% confidence.								