INTERVIEWER EXPERIENCE AND INTERVIEW BEHAVIORS

Kristen Olson and Andy Peytchev, University of Michigan
Institute for Social Research, 426 Thompson St., Ann Arbor, MI 48104

Key Words: Interviewer effects, Interviewer experience, Interviewer behavior, Interview order, Interview length, HLM

1 Introduction

Interviewers set the rules of a survey interview for respondents. An interviewer's behavior and demeanor guides the survey interaction. Through this behavior, respondents infer their role, perhaps unknowingly (Kahn and Cannell 1957). Although standardized interviewer training is designed to encourage positive interviewer behaviors and minimize the variation in behaviors across interviewers, much is still left to interviewer discretion.

An interviewer may have experience over her lifetime conducting surveys, experience within a particular survey organization, experience over multiple waves of a longitudinal survey, and experience that cumulates over a single survey cycle. When experience is defined as general experience on any survey, experienced interviewers elicit higher quality data, such as less item missing data, higher correlations between key study variables, or more reports of sensitive items (Cleary, Mechanic et al. 1981; Singer, Frankel et al. 1983; O'Muircheartaigh and Campanelli 1998).

However, when experience is operationalized as prior experience on the same survey in previous years, the findings are actually the opposite, at least for certain sensitive topics. For example, Bailar et al. (1977) found that experienced interviewers elicited more item missing data to income questions on the Interviewer Variance Study (for the National Crime Survey). Interviewers with no experience in the National Household Survey on Drug Abuse (NHSDA) obtained higher reports of drug use than their more experienced counterparts (Turner, Lessler et al. 1992; Hughes, Chromy et al. 2002). Interestingly, Bradburn, Sudman and Associates (1979) found that more interviewer behaviors in general (reading errors, speech variations, probes and feedback) occurred for interviewers with more overall experience (as measured by number of years employed at NORC, pp. 28-30).

The last type of experience, interview order, which cumulates over the survey's current administration, relates to the interviewer gaining familiarity with a particular instrument under a given set of survey conditions. As the number of completed interviews increases, what is learned in training may be gradually replaced by experience.

Authors' Note: The authors would like to thank Steve Raudenbush for comments on an earlier draft.

At least some evidence exists that interviewer behaviors (van der Zouwen, Dijkstra et al. 1991), response distributions (e.g., reports of lifetime drug use in Hughes et al. (2002) and potentially response biases (hospitalization reports in Cannell et al. (1977) change as an interviewer conducts more surveys conducted within a single study.

Two reasons have been suggested in the literature for why interviewers might change behaviors over a survey cycle. First, researchers have hypothesized that interviewers accelerate the pace with which they administer a questionnaire over a survey cycle, thereby becoming careless (Fowler 1991; Pickery and Loosveldt 2001). From a response quality perspective, Cannell and his colleagues (1981) argued that the pace of an interview affects the attention given to the response task. Faster interviews could lead to lower response quality simply because the respondent is not able to devote adequate time to all parts of the response formation process. There is limited, mixed evidence that this happens (Hox 1994).

Second, other researchers have hypothesized that interviewers learn something from the early interviews that might change their attitudes about what might happen in future interviews that changes their behaviors accordingly (Cannell, Marquis et al. 1977). Interviewer behavior at a given question is partially a reaction to a respondent's uneasiness with that question (Sudman and Bradburn 1974; Sudman, Bradburn et al. 1977; Singer and Kohnke-Aguirre 1979; Singer, Frankel et al. 1983). Alternatively, interviewers may become fatigued after conducting many interviews (Cannell, Marquis et al. 1977; Fowler 1991). As interviewers tire, training may be replaced by experience, and behaviors become less standardized.

Both of these phenomena may change survey responses. An interviewer who delivers questions quickly may have respondents who report answers quickly, perhaps shortcutting the cognitive work necessary to the survey task. Additionally, to the extent that interviewer expectations/evaluations of respondents or general motivation levels are predictive of behavior, then more negative evaluations or a decrease in motivation may lead to detrimental behavioral tactics.

We examine two measures that proxy for these survey conditions: the overall length in minutes of conducting an interview, and interviewer evaluations of the respondent's interest in the survey interview. This study will address the following three research questions:

1. Do interviewers alter their behavior over the course of the interviewing cycle?
2. Do interviewers' perceptions change over the course of the interviewing cycle?

3. Do more experienced interviewers differ in these behaviors from inexperienced interviewers?
4. Are these interview order effects different for inexperienced versus experienced interviewers?

2 Data and Methods

Data. We use data from the pre-election 1984 and 1988 National Election Studies conducted by the Survey Research Center (SRC) at the University of Michigan (Miller 2000; Miller 2000). The National Election Studies (NES) are a multistage area probability sample, with face to face interviews on political candidates, parties, American politics in general, and other related topics. In order to accurately gauge the political climate, sample was released in four replicates over the eight weeks prior to the elections (Ronald Reagan's re-election in 1984 and George H.W. Bush's election in 1988). That is, every two weeks, a random sample of the total workload was released. Thus, the type of respondents interviewed in the first two weeks of the survey are not, on average, different from the type of respondents interviewed in the last two weeks of the survey.

Over 100 interviewers in over 40 PSUs were used to collect data from over 2000 respondents in both years. In order to achieve more stable estimates within interviewers that are also more informative about the cumulated effect of conducting multiple interviews, interviewers who had conducted less than 10 interviews or had worked in only one sample replicate were removed. Interviewers in 1984 collected data from an average of 24 respondents; 1988 interviewers averaged approximately 21 interviews each. In 1984, the largest interviewer workload was 59 cases; in 1988, one interviewer completed 53 cases. The data for 1988 also contain interviewer experience, where half of the interviewers had worked at the SRC for at least 2 years.[1] Since cases may not be randomly assigned to interviewers within PSUs, there may be a confounding between respondent type and interviewer. However, our key independent variable requires random allocation of sample cases across the survey collection period, a strength of the 1984 and 1988 NES. We will include respondent level demographic controls as robustness checks against our primary models.

*Methods***.** It has become relatively common practice (Hox, de Leeuw et al. 1991; Hox 1994; O'Muircheartaigh and Campanelli 1998; 1999; Campanelli and O'Muircheartaigh 2002) to use multilevel models when studying interviewer effects. The traditional model estimates, for an outcome Y_i, and covariates $[X_{pi}]$

$$Y_i = \beta_0 + \beta_1 X_{1i} + \ldots + \beta_p X_{pi} + e_i .$$

This model assumes that the errors e_i are normally distributed with a mean of zero, a common variance, and are uncorrelated. However, a good deal of clustering naturally takes place in a survey situation – in particular, respondents are nested within interviewers. Traditional statistical analyses that fail to account for this dependence will lead to biased parameter estimates and standard errors.

The nature of hierarchical models also allows unbiased modeling of interviewer-level covariates, given a correctly specified model. Specifically, we use HLM 5.45 (Raudenbush, Bryk et al. 2001) to estimate two-level hierarchical linear models. The final model we estimate for each dependent variable is

Level 1: Respondent Model

$$Y_{ij} = \beta_{0j} + \beta_{1j} \ln(Order_{1ij}) + \beta_{2j} (R.Age - \overline{Age..})_{2ij} + \beta_{3j} (R.Educ - \overline{Educ..})_{3ij} + r_{ij}$$

Level 2: Interviewer Model

$$\beta_{0j} = \gamma_{00} + \gamma_{01} InterviewerExperience_{01} + u_{pj}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11} InterviewerExperience_{11} + u_{pj}$$

In this model, we allow the interviewer mean and order effects to vary randomly across interviewers, but constrain the effects of respondent age and education to be fixed across interviewers. We center the respondent level characteristics (other than interview order) around the grand mean, so that the interpretation of the intercept is simply the interviewer level mean controlling for these characteristics (Raudenbush and Bryk 2002).

As a baseline model, a multilevel ANOVA model will be estimated using the NES data. From this model, the Intraclass Correlation Coefficient, ρ_{int} (measuring the within interviewer homogeneity of responses), will be calculated.

Respondents may vary in terms of cognitive abilities and therefore susceptibility to interviewer effects; cognitive abilities may also have a main effect on our dependent variables of interest. Two respondent characteristics that proxy for cognitive abilities are included in the models as control variables: age (Sudman and Bradburn 1973; Rodgers and Herzog 1992) and education (Sudman and Bradburn 1974; Bradburn, Seymour Sudman et al. 1979; Krosnick and Narayan 1996; Knauper 1999).

Two measures of interviewer experience are used in this paper. First, we dichotomize prior interviewer experience as an interviewer-level indicator for whether the interviewer has one year of experience or less as a Survey Research Center interviewer ("Prior experience"). Prior experience was available only for 1988 interviewers. We cannot distinguish an interviewer's prior experience on prior waves of the NES. The other experience measure, a respondent level variable, is a continuous sequential number of the interview conducted within each interviewer (experience within a survey, or "Interview

[1] Interviewer-level demographic and experience information was not publicly available for the 1984 data.

order"). That is, an interviewer's first completed interview is assigned the value "1," her second completed interview is assigned the value "2," and so on.

First, we examine the length of time in minutes needed to conduct the interview. Interviewers recorded the start, end, and total time to conduct an interview on cover sheets for each case. Second, we look at the interviewer's evaluation of the respondent's interest in the interview, measured on a five-point Likert scale, and completed by the interviewer after conducting the interview. Although Likert-scales are ordinal measures, (and not interval), we use a linear model in these analyses. Both models were estimated using the 1988 data, and the relationships were similar in both models. The hierarchical cumulative logit model did not converge in the 1984 data. For consistency in analyses across these two years, we use a linear model.

3 Findings

We first present bivariate analyses, examining interview order, interviewer experience and our two dependent variables. We then present two models for each dependent variable. The first model includes only respondent-level characteristics. The second adds interviewer-level covariates as predictors of the respondent-level outcomes. Because there is evidence that the effect on variance estimates of clustering within interviewer may be as great as the effect of clustering within PSUs, we use the bivariate results to be informative about trends, but restrict discussion of significant differences to the model results.

3.1 Bivariate Analyses

Interview Length. Preliminary analyses of both the 1984 and 1988 surveys reveal that the length of the interviews consistently decreases with order of interview.[2] That is, interviewers conduct faster interviews as they do more interviews. These analyses also suggest a main effect of prior interviewing experience: interviewers with prior interviewing experience conduct interviews at a faster pace overall, conduct their first interviews at a faster pace than the inexperienced (they receive less intensive training due to their prior experience), and hence their rate of change is smaller than that of the inexperienced. The relationship between interview order and interview length appears to decrease more quickly during the early interviews and then obtain a more steady pace. In light of this relationship and for model parsimony, interview order is included as a log term in the hierarchical linear models.[3]

Interviewer's Evaluation of Respondent Interest. In both years, interviewers' evaluation of respondents' interest in the interview also appears to decrease over consecutive interviews. In 1988, that effect seems to be driven only by the inexperienced interviewers.

3.2 Model Estimates: Interview Order

Interview Length. As discussed above, hierarchical linear models were fit in order to account for the nested structure of the data. A two-level model with no covariates is estimated, a one-way ANOVA model with random effects. The obtained ρ_{int} values of 0.22 for 1984 and 0.27 for 1988 demonstrate that 22% and 27% of the variance of interview length is between interviewers in 1984 and 1988, respectively. We note that this behavioral consistency within interviewer is much larger than estimates of ρ_{int} for traditional survey responses (which are usually around 0.01, see, e.g., Groves and Magilavy 1980).

In Model 1 (see Table 1) the natural logarithm of interview order is entered as a random effect at the respondent level, controlling for the respondents' age and level of education (centered around their group mean), obtaining separate estimates of the effect of interview order on the pace of the interview for each interviewer. Based on this model, an interviewer's first interview in 1984 is estimated to be 84 minutes and the 20^{th} interview is estimated to be about 72 minutes. Said another way, interviewers appear to pick up speed as they conduct more interviews, regardless of the age or education of the respondent. The inclusion of interview order explains about 15 percent of the variance among respondents in interview length in 1984 and about 13 percent of the variance in 1988. Additionally, from these models, the effect of interview order on pace varies randomly across interviewers (a significant variance component) in both years. That is, the rate of "speeding up" varies significantly across interviewers.

Interview Interest. Based on the ANOVA model, more than 15 percent of the variance in interviewer evaluations of the respondent's interest in the interview is between interviewers. This is expected, given that different interviewers may interpret the construct of "interest" differently, in addition to the non-random assignment of respondents. In Model 3 (Table 1) we see that the inclusion of interview order has a weak but significant negative effect on the overall rating of interview interest that stays even after controlling for respondent characteristics in both years of the survey. That is, interviewers are more likely to rate their respondents as being less interested in the interview as they conduct additional interviews. We would expect that respondents would actually be *more* interested in the interview in the later interviews since the actual election date is closer in time for the later interviews, so this finding suggests an interviewer effect is present on this interviewer-completed question (whether interviewer behavior is affecting respondent interest, whether it is merely changes in interviewer perceptions, or both).

3.3 Model Estimates: Interviewer Experience

[2] Analyses available from authors upon request.

[3] Models were also run with Order as a linear term. The conclusions are largely consistent. Models available from authors upon request.

Interview Length. Inclusion of the interviewer-level dummy variable of one year or less prior SRC interviewing experience has a significant effect on the length of the interview (Table 1, Model 2). Furthermore, we expected that inexperienced interviewers also "get faster" quicker than experienced interviewers, thereby rates for increasing pace are allowed to vary for the two experience groups. The mean difference in interview length between the inexperienced and the experienced interviewers, accounting for the order of the interview, interaction between order and experience, and respondent age and education, is as high as 14 minutes. Significantly, interviewer experience introduces a substantively large shift on the mean interview length for the first interview and on the relationship between order of interview and length of interview. Inexperienced interviewers take significantly longer with their first interview than experienced interviewers. Every three interviews conducted by an inexperienced interviewer result in a decrease of three minutes in interview length, relative to experienced interviewers. Figure 1 illustrates this relationship in more detail. Also note that this single interviewer-level covariate explains a significant amount of the interview order effect at the respondent level, such that the respondent-level coefficient is no longer significant.

Interest. Interviewer experience clearly has a different relationship with evaluations of respondent interest than with interview length. There is no observed effect on the average evaluated level of respondent interest and has no relationship with the rate of change in this measure over interviews (Model 4).

4 Discussion

Both the 1984 and 1988 National Election Studies examined here show that, controlling for respondent characteristics of age and education, interview order is negatively associated with the length of the interview. As an interviewer conducts additional interviews, the length of those interviews decreases. The effect of interview order is not limited to interview length, as it is also associated with a decrease in the interviewer-reported respondent interest in the interview. There was also limited support in the 1988 data that interview order also corresponded with changes in respondent behavior, as measured by a slight increase the number of reports given to a series of open-ended questions. Especially notable in these findings is that the sample was randomly allocated across the course of the survey, such that every two weeks had an equivalent pool of respondents. Identical models were run replacing interview order with the sample replicate, and similar trends were observed. Thus, the observed change is not due to a change in respondent pool over the course of the survey.

Two or more years of prior survey experience also had a significant relationship with interviewer behavior, as more experienced interviewers conducted their interviews faster. The effect of interviewer experience was not statistically significant for interviewer evaluations of respondent interest or with the respondents' reported number of likes and dislikes for given political parties and candidates.

Notably, the effect of interview order was present for both experienced and inexperienced interviewers, but was significantly different for the two groups. Inexperienced interviewers completed their first interviews much slower then their more experienced counterparts. Although both experienced and inexperienced interviewers saw a decrease in the length of their interviews as they carried out additional interviews, inexperienced interviewers "sped up" interviews faster than interviewers with more experience.

It is clear from these findings that the nature of the interaction between interviewer and respondent changes as interviewers conduct more interviews and gain experience. What remains unknown is what parts of the interaction are altered. For instance, the decrease in interview length may be due to interviewers asking questions at a much faster rate, but it may also be due to fewer deviations from the interview script. These deviations may be beneficial or detrimental. Interviewers may be less likely to engage in unnecessary feedback or unrelated conversation with later respondents. Alternatively, interviewers may be less inclined to provide in-depth feedback or to encourage respondents to ask for clarification. Interviewers may also use interviewing techniques such as directive probing that generate answers without as much dialogue between the two actors (see, e.g., van der Zouwen, Dijkstra et al. 1991). In-depth examinations of interviewer/respondent interactions over multiple interviews by the same interviewer are required in order to evaluate how undesirable and which of these (or what combination of these) effects are occurring.

Although interview order and interviewer experience affect interview length and to some extent interviewer evaluations of respondent interest, further questions arise on the relationship between the observed effects. One possibility is that interview length and interview interest are related. For instance, if an interviewer conducts an interview more quickly, respondent may be less interested in the survey task. Alternatively, interviewers may rush through an interview when they notice that respondents are not interested in the survey topic. Another explanation could be that over multiple interviews, interviewers begin to expect respondents to be uninterested in the survey topic, thereby administering the survey in less time for all subsequent respondents. Certainly, these relationships are manifestations of the causal arrows running in opposite directions. In order to understand the observed changes in interviewer behaviors, a more thorough investigation of what happens to interviewers as they conduct more interviews is needed.

5 References

Bailar, B. A., L. Bailey, et al. (1977). "Measures of interviewer bias and variance." Journal of Marketing Research 14: 337-343.

Bradburn, N. M., Seymour Sudman, et al. (1979). Improving Interview Method and Questionnaire Design: Response Effects to Threatening Questions in Survey Research. San Francisco, Jossey-Bass.

Campanelli, P. and C. O'Muircheartaigh (2002). "The Importance of Experimental Control in Testing the Impact of Interviewer Continuity on Panel Survey Nonresponse." Quality and Quantity 36(2): 129-144.

Cannell, C., P. Miller, et al. (1981). "Research on Interviewing Techniques." Sociological Methodology: 389-437.

Cannell, C. F., K. H. Marquis, et al. (1977). A Summary of Studies of Interviewing Methodology, Vital Health Stat. No. 69.: 77-1343.

Cleary, P. D., D. Mechanic, et al. (1981). "The effect of interviewer characteristics on responses to a mental health interview." Journal of Health and Social Behavior 22(2): 183-193.

Fowler, F. J. (1991). Reducing Interviewer-Related Error Through Interviewer Training, Supervision, and Other Means. Measurement Errors in Surveys. S. Sudman. New York, Wiley: 259-278.

Groves, R. M. and L. Magilavy (1980). Estimates of Interviewer Variance for Telephone Surveys. Proceedings of the Survey Research Methods Section of the American Statistical Association.

Hox, J. (1994). "Hierarchical Regression Models for Interviewer and Respondent Effects." Sociological Methods and Research 22(3): 300-318.

Hox, J., E. de Leeuw, et al. (1991). The Effect of Interviewer and Respondent Characteristics on the Quality of Survey Data: A Multilevel Model. Measurement Errors in Surveys. S. Sudman. New York, Wiley: 439-462.

Hughes, A., J. Chromy, et al. (2002). Impact of Interviewer Experience on Respondent Reports of Substance Use. Redesigning an Ongoing National Household Survey. J. Gfroerer, J. Eyerman and J. Chromy. Washington, DC, Substance Abuse and Mental Health Services Administration: 161-184.

Kahn, R. L. and C. F. Cannell (1957). The Psychological Basis of the Interview. The Dynamics of Interviewing: Theory, Technique, and Cases. New York, John Wiley & Sons: 22-64.

Knauper, B. (1999). "The Impact of Age and Education on Response Order Effects in Attitude Measurement." Public Opinion Quarterly 63(3): 347-370.

Krosnick, J. A. and S. Narayan (1996). "Education Moderates Some Response Effects in Attitude Measurement." Public Opinion Quarterly 60(1): 58-89.

Miller, W. E. a. t. N. E. S. (2000). American National Election Study, 1984, Inter-university Consortium for Political and Social Research. 2003.

Miller, W. E. a. t. N. E. S. (2000). American National Election Study, 1988, Inter-university Consortium for Political and Social Research. 2003.

O'Muircheartaigh, C. and P. Campanelli (1998). "The Relative Impact of Interviewer Effects and Sample Design Effects on Survey Precision." Journal of the Royal Statistical Society, A 161: 63-77.

O'Muircheartaigh, C. and P. Campanelli (1999). "A Multilevel Exploration of the Role of Interviewers in Survey Non-response." Journal of the Royal Statistical Society, A 162: 437–446.

Pickery, J. and G. Loosveldt (2001). "An Exploration of Question Characteristics that Mediate Interviewer Effects on Item Nonresponse." Journal of Official Statistics 17(3): 337-350.

Raudenbush, S. W. and A. S. Bryk (2002). Hierarchical Linear Models: Applications and Data Analysis Methods. Newbury Park, CA, Sage.

Raudenbush, S. W., A. S. Bryk, et al. (2001). HLM 5: Hierarchical Linear and Nonlinear Modeling. Lincolnwood, IL, Scientific Software International.

Rodgers, W. L. and A. R. Herzog (1992). Collecting Data About the Oldest Old: Problems and Procedures. The Oldest Old. K. G. Manton. New York, Oxford University Press: 135-156.

Singer, E., M. R. Frankel, et al. (1983). "The Effect of Interviewer Characteristics and Expectations on Response." Public Opinion Quarterly 47: 68-83.

Singer, E. and L. Kohnke-Aguirre (1979). "Interviewer Expectation Effects: A Replication and Extension." Public Opinion Quarterly 43: 245-260.

Sudman, S. and N. Bradburn (1974). Response Effects in Surveys, A Review and Synthesis. Chicago, Aldine Press.

Sudman, S. and N. M. Bradburn (1973). "Effects of Time and Memory Factors on Response in Surveys." Journal of the American Statistical Association 68(344): 805-815.

Sudman, S., N. M. Bradburn, et al. (1977). "Modest Expectations: The Effects of Interviewers' Prior Expectations on Response." Sociological Methods and Research 6: 177-182.

Turner, C. F., J. T. Lessler, et al. (1992). Effects of Mode of Administration and Wording on Reporting of Drug Use. Survey Measurement of Drug Use: Methodological Studies. C. F. Turner, J. T. Lessler and J. Gfroerer. Rockville, MD, National Institutes of Health.

van der Zouwen, J., W. Dijkstra, et al. (1991). Studying Respondent-Interviewer Interaction: The Relationship Between Interviewing Style, Interviewer Behavior, and Response Behavior. Measurement Errors in Surveys. S. Sudman. New York, Wiley: 419-438.

Table 1: Estimated Coefficients, Standard Errors, and Variance Components for Three Hierarchical Linear Models Predicting Length of Interview in Minutes and Interviewer-Reported Respondent Interest in Interview (1=Low, 5=High), 1984 and 1988.

	Length			Interest		
Coefficient	Model 1		Model 2	Model 3		Model 4
(Standard Error)	1984	1988	1988	1984	1988	1988
Fixed Effects						
Respondent Level						
Intercept	84.49***	72.49***	65.50***	3.74***	3.65***	3.63***
	(2.05)	*(1.64)*	*(2.08)*	*(0.07)*	*(0.07)*	*(0.10)*
Log(Interview Order)	-3.81***	-2.18***	-0.82	-0.08***	-0.06*	-0.056
	(0.70)	*(0.50)*	*(0.68)*	*(0.02)*	*(0.02)*	*(0.034)*
Respondent Age	0.30***	0.27***	0.27***	-0.00004	0.0004	0.0004
(Centered around grand mean)	*(0.02)*	*(0.02)*	*(0.02)*	*(0.001)*	*(0.001)*	*(0.001)*
Respondent Education = High School Degree or Less = 1	-2.49***	-3.36***	-3.33***	-0.55***	-0.57***	-0.57***
(Centered around grand mean)	*(0.86)*	*(0.74)*	*(0.73)*	*(0.04)*	*(0.04)*	*(0.04)*
Interviewer Level						
Less than one year of experience = 1			14.01***			0.04
			(2.94)			*(0.15)*
Interaction: Interview Order * Less than one year of experience			-2.75***			-0.001
			(0.97)			*(0.05)*
Random Effects						
Sigma^2 (Respondent level)	311.78	209.41	209.29	0.81	0.76	0.76
T00 (interviewer means)	270.09***	160.28***	113.46***	0.14**	0.19***	0.20***
T11 (interview order)	23.35***	6.81***	5.36*	0.001	0.002	0.002
Proportional decrease of Sigma^2 (from base ANOVA model)	15.1%	13.4%	13.4%	6.9%	7.3%	7.3%
Deviance	18877.80	15817.58	15791.27	5840.19	5014.08	5021.13
Effective sample size	2,170	1,905	1,905	2,161	1,893	1,893

*** p<.001, ** p<.01, *** p<.001
Random effects tested using a chi-square test.

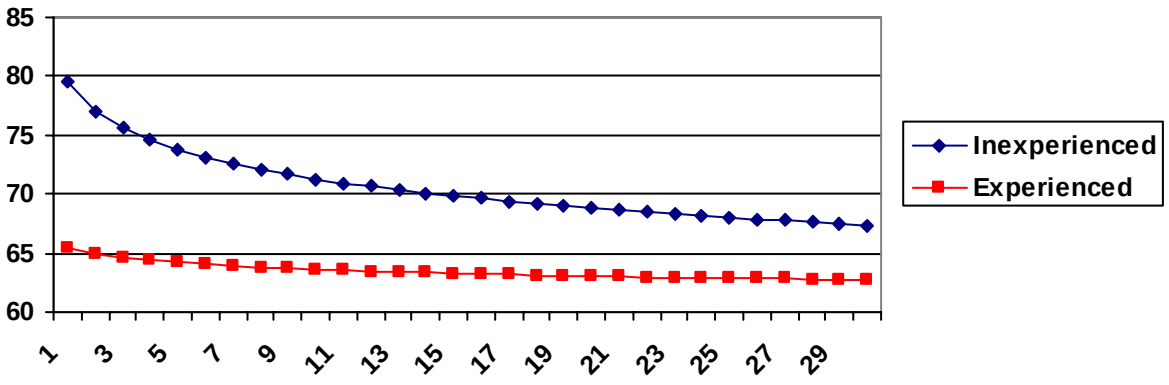

Figure 1: Predicted Effect of Interviewer Experience and Interview Order on Length of Interview, Controlling for Respondent Characteristics (Model 2)