

## **TELESCOPING OF LANDMARK EVENTS IMPLICATIONS FOR SURVEY RESEARCH**

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GEORGE D. GASKELL

*London School of Economics*

DANIEL B. WRIGHT

*University of Bristol*

COLM A. O'MUIRCHEARTAIGH

*University of Chicago*

### **Introduction**

Survey respondents are often asked to report on infrequent but consequential events such as hospitalization, employment history, motor accidents, and purchases of major household items and also to report on frequent but mundane behaviors, such as food and alcohol consumption, television viewing, and use of public transport. Respondents may be asked to recall various details about such events and behaviors, and sometimes, for the more important events, they are asked when the event occurred. It is surprisingly difficult to make such an estimate, even when the event is salient. As Gray (1955) noted, "it is often the event, and not when it happened, which appears important to the informant" (p. 362).

Survey researchers have identified several types of errors that respondents can make in response to retrospective questions. Respondents may forget details or even entire events. Although less common, respondents may recall events that did not occur. These are referred to as errors of omission and commission, respectively. Our concern is with another type of error: temporal displacement or telescoping. Respondents may recall an event but report that it happened earlier than it actually did (backward telescoping) or report that it happened more recently (forward telescoping). In recognition of this problem, Loftus and Marburger (1983) explored the use of highly salient events

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as temporal markers in survey questions. They called these events *landmarks*. In this article we explore issues involved with the use of landmark events in surveys.

In general terms, there are three types of questions asked in surveys that require some form of temporal estimation. These are: (a) has a target event occurred since \_\_\_\_? (has), (b) how many times has the target event(s) occurred since \_\_\_\_? (how many), and (c) when did the target event occur? (when).

Each of these question types is associated with different estimation strategies and different error profiles. "Has" questions are often used for infrequent events, while "how many" questions are used for more frequent events. Both of these types involve a similar problem: how to make the reference period clear to the respondent. For example, the question may be phrased: "In the last 6 months, that is, since [date 6 months prior], has X happened?" The problem with this formulation is that events outside the boundary may be forward telescoped into the target period. One reason this can happen (see Loftus et al. [1990] for other reasons) is because the boundary is not a salient feature of the respondent's memory. Neter and Waksberg (1964) describe the advantages of using what they call bounded interviews, where the first interview of a panel study sets the boundary for later interviews. With such a procedure not only can the interviewer probe to check that reported episodes of repeated behaviors are indeed new, but he can also make the temporal boundary clear for the respondent. Unfortunately, this technique is viable only in multiwave surveys (e.g., in the U.S. Consumer Expenditure Survey, the data from the first of five interviews are used only as a bound for the second interview). However, Sudman, Finn, and Lannom (1984) adapted this technique for single interviews by asking respondents initially about the previous month and then asking about the current month (see also Belli 1998; Loftus et al. 1990).

The final type, "when" questions, involves asking respondents to date a target event that is known to have occurred, often established from previous questions. This is increasingly used now that event history analysis (Yamaguchi 1991) is becoming more common in employment and welfare surveys. For example, respondents in employment surveys are often asked to date when they began and when they finished various jobs.

All three question types rely on the respondent locating an event in time. For the first two question types the respondent needs to have a temporal marker for the boundary specified in the question. For the "when" questions there is an explicit requirement for precise location. In all cases there is a reference period, an explicit temporal time frame, the boundaries of which must be communicated. Questions that ask, "In the last 6 months . . . ?" require respondents to place events from their life accurately as occurring within or outside this period. For most people "6 months ago" is unlikely to

be a salient marker. To overcome this problem landmark events were proposed for use in survey questions.

In May 1980, Mount St. Helens, a volcano in Washington State, erupted. Six months later, Loftus and Marburger (1983) compared responses to the following questions: "In the last 6 months, did anyone try to rob you?" and "Since the first major eruption of Mount St. Helens, has anyone tried to rob you?"

The results showed that the inclusion of the landmark reduced the tendency to forward telescope experiences of victimization. They also tested other landmarks, for example, New Year's Day, and other target events, for example, eating a lobster. In a total of five experiments they found these landmark events to decrease forward telescoping and to increase accuracy.

There are two possible models that may explain how landmarks lead to more accurate reporting. The weak version is that a landmark event merely provides a distinguishing mark in memory that enables respondents to determine whether another event occurred before or after it. The strong version is that additionally the landmark event can be accurately dated and that the dates of other events can be established by reference to that date. For survey questions with a fixed reference period the latter model needs to hold if the use of landmark events is to improve substantially the quality of survey responses.

Loftus and Marburger (1983) discuss possible problems with the use of landmark events. The first is that the "landmark events themselves may be telescoped forward in people's memories" (p. 119). The second is that the landmark event must be equally salient for all people in the target population. With respect to the first problem, Brown, Rips, and Shevell (1985; see also Bradburn, Rips, and Shevell 1987) discuss a mechanism that might lead to systematic biases in temporal estimations of landmark events. They hypothesized that "the more you know, the more recent the event will seem, other things being equal" (p. 141). This is called the accessibility principle, and it explains why some of the more notable events in a person's life are subjectively experienced as having happened "only yesterday." The second problem that Loftus and Marburger (1983) raise is that for the landmark event procedure to be useful the event must be "anchored among all the target population groups" (p. 119). By this they mean that the landmark event must be memorable to all subgroups in the population of interest. It is reasonable to assume that the eruption of Mount St. Helens would have been extremely salient for all their Washington State respondents. However, there may be group differences for other salient events.

Consider the impact of moving house, an important event and a likely candidate for a landmark event. Auriat (1993) found that women made fewer dating errors than did their husbands in reporting house moves. Loftus et al. (1992) also found gender differences in the recall of health-related events in the preceding year. They found that women's recall was more complete and accurate than was men's recall. There is also evidence of gender differences

from laboratory studies. Skowronski and Thompson (1990) asked university students to date unique personal events that had been recorded in a diary during the last 3 months. In a meta-analysis of four studies, women were found to be significantly more accurate than men. In surveys with proxy responding or where the unit of analysis is the family, the interviewer sometimes has the choice of interviewing a male or female; this research is clearly informative. In addition to gender differences, other research points to the likelihood of age (Verhaeghen and Salthouse 1997) and social category (Herrmann and Guadagno 1997) also correlating with dating accuracy.

While there is both theoretical and empirical evidence of the utility of the landmark procedure, the technique is not without potential problems. The goal of the present research is first to determine the overall accuracy of dating for two landmark events. Second, we examine whether dating errors for landmark events are systematically associated with sociodemographic characteristics and, therefore, could confound true differences among population subgroups with measurement error.

## The Research

The present research explores the accuracy of dating two landmark news events in a national sample of the British public. Since recall of current news across a range of topics is consistently related to background political knowledge (Price and Zaller 1993), we explicitly chose two dramatic national events that dominated the media and that previous research had shown were salient and well remembered in Britain (Conway et al. 1994; Wright 1993). The first is Margaret Thatcher's resignation as Prime Minister. The second is the Hillsborough football disaster in which 96 people were crushed to death in full view of a national television audience. The events occurred, respectively, 19 months (Thatcher's resignation) and 37 months (the Hillsborough disaster) before our study was conducted. We report other data on these events with respect to Brown et al.'s accessibility principle elsewhere (Wright, Gaskell, and O'Muircheartaigh 1997).

The study was embedded in the June 1992 Office of Population Censuses and Surveys (OPCS) face-to-face omnibus survey and was conducted in collaboration with the Joint Centre for Survey Methodology. The OPCS omnibus uses a stratified multistage probability sample. The sampling frame is based on the Postcode Address File of "small users." Of the 3,000 targeted addresses, 2,653 were eligible households and, of these, 2,136 agreed to be interviewed (response rate of 81 percent). There were 31 whose data were missing for the temporal estimation questions (not "don't know" responses).

All respondents were asked eight questions in the same order. First, there were three questions concerned with memory quality for Thatcher's resignation: memory clarity, event importance, and emotional reaction, and the

results of these questions are discussed elsewhere (Wright, Gaskell, and O'Muirheartaigh 1998). While these memory quality questions were included to test a particular hypothesis in memory theory, they also served to prime, or activate, people's memories of the events, thus making the rather difficult dating task a little easier. The inclusion of these questions is also in keeping with typical survey practice; difficult questions are normally preceded by appropriate introductory questions. Respondents were then asked for the month and year of the event. Then the same questions were asked about the Hillsborough disaster. The preambles, memory quality questions, and the dating questions are given in the appendix.

The responses to the dating question were coded by the interviewers into the fixed categories. Respondents did not see the categories as these might have provided temporal cues. The categories were designed to allow us to create an index of the degree of dating errors. With the benefit of hindsight our choice of fixed categories was suboptimal. Previous research on university students showed that people recalled these events well and dated them with reasonable accuracy. However, in the present study, in a survey rather than an experimental context, and with a national sample rather than a convenience sample of students, the errors by some respondents were much more extreme than we had anticipated. Because of this problem we concentrate on the direction and prevalence of telescoping and not on the magnitudes.

## **Results**

For Thatcher's resignation and the Hillsborough disaster, respectively, tables 1 and 2 give the percentages of correct estimates, forward telescoping, backward telescoping, and DK responses broken down by age, gender, and social class. Note that while the data set contained "terminal age of education," this is confounded with age due to changes in the British educational system and is an unsatisfactory measure of educational attainment. It can be seen that of those who gave an estimate 15 percent were correct within 1 month for Thatcher's resignation, and 10 percent were correct for Hillsborough. The tables also show that there was more forward than backward telescoping for Thatcher's resignation but the opposite tendency for the Hillsborough disaster.

To disentangle the relations between response patterns and the respondents' sociodemographic characteristics we performed a series of logistic regressions for each target event. The first analyses look at the extent to which different subpopulations opted for the DK option. Two logistic regressions were carried out with the proportion answering DK as the dependent variable. In model 1 the demographic variables gender, age, and social class were used as predictors. In model 2 three additional predictors were included, these being the three memory quality indicators. Offering the DK option to the respondents essentially creates a filter for the dating question; hence, the base for the next stage

**Table 1.** Response Profiles for Thatcher's Resignation by Sociodemographic Categories

	<i>N</i>	% Correct	% Forward Telescoping	% Backward Telescoping	% Don't Know
Total	2,109	15.2	39.4	30.6	14.9
Male	976	17.0	37.1	34.2	11.7
Female	1,128	13.7	41.4	27.4	17.6
Age:					
16–24	341	17.9	49.0	22.1	11
25–34	382	16.7	43.5	26.7	13.1
35–44	370	15.2	44.8	24.7	15.3
45–54	329	16.3	37.3	35.3	11.1
55–64	264	13.7	31.4	40.8	14.1
65–74	250	13.1	31.7	35.5	19.7
75 and older	147	14.0	24.9	38.6	27.3
Social category:					
Professional	84	29.2	33.9	30.4	6.5
Intermediate	487	22.0	35.4	31.2	11.5
Skilled nonmanual	488	16.1	43.4	27.5	13.1
Skilled manual	419	11.3	40.5	35.5	12.9
Semiskilled	368	10.2	40.3	29.6	19.8
Unskilled	173	6.7	38.0	33.0	22.0

of the logistic regression analysis was the set of respondents offering a date. Model 1 and model 2 were repeated with the dependent variable being first the proportion giving a correct response (within 1 month of the actual date) and second the proportion of incorrect respondents who forward telescoped the date. The results of the two models are shown in table 3.<sup>1</sup> Positive pa-

1. There are a number of ways of analyzing the tendency to forward and backward telescope; the essential decision is what base to use for the analysis. If the purpose of the question were to estimate the date, then our concern would be with the possibility of bias in that estimate. For this purpose the *difference* between the proportions forward and backward telescoping would be the relevant measure, and the base should be the full set of responses excluding DKs. If, on the other hand, we are interested in the *relative* amount of backward and forward telescoping (e.g., the ratio of forward to backward) then the base should exclude those answering correctly. Possible discrepancies between the two analyses could arise where the total proportion telescoping was very different in different subpopulations. As an albeit extreme illustration, consider a population made up of two equal groups with an overall forward telescoping proportion of 29 percent and backward telescoping of 13 percent, a difference of 16 percent, and a ratio of 2.2:1 in favor of forward telescoping. If subpopulation A had 10 percent forward telescoping and 2 percent backward telescoping, this would give a difference of 8 percent and a ratio of 5:1 in favor of forward telescoping. If subpopulation B had 48 percent forward telescoping and 24 percent backward telescoping, this would give a difference of 24 percent and a ratio 2:1 in favor of forward telescoping. A logistic analysis using as a base only those who telescoped the date would conclude that subpopulation A had a greater tendency to forward telescope; a logistic analysis using as a base all those who answered would conclude that subpopulation B had a greater tendency both to forward and backward telescope, a conclusion that would be supported

**Table 2.** Response Profiles for the Hillsborough Disaster by Sociodemographic Categories

	<i>N</i>	% Correct	% Forward Telescoping	% Backward Telescoping	% Don't Know
Total	2,104	10.2	28.5	42.2	19.2
Male	975	13.5	26.6	44.6	15.2
Female	1,129	6.9	29.8	39.0	24.2
Age:					
16–24	341	15.0	29.1	38.4	17.5
25–34	382	13.7	33.2	35.6	17.5
35–44	371	11.4	27.9	40.9	19.9
45–54	329	8.4	32.2	45.4	14
55–64	262	8.6	25.1	45.2	21.1
65–74	252	4.2	20.8	50.1	25
75 and older	146	2.4	24.1	37.2	36.2
Social category:					
Professional	84	13.1	26.8	46.4	13.7
Intermediate	486	14.1	27.8	41.2	17
Skilled nonmanual	489	7.8	32.0	42.4	17.8
Skilled manual	421	13.6	26.5	43.1	16.8
Semiskilled	366	5.5	30.9	42.8	20.9
Unskilled	174	6.6	20.8	38.4	34.1

rameters indicate more DKs, more correct estimates, and more forward telescoped responses, respectively. Gender was treated as a dummy variable (0 for males, 1 for females), age was analyzed in years (in tables 1 and 2 this has been collapsed into 10-year periods), and social class was treated as an interval variable from 1 (professional) to 6 (unskilled). Other metrics were used for social class, yielding similar results. All the interactions were examined, but only the significant effects are discussed below.

Considering first model 1, the proportion of DK responses for both events was significantly related to gender, age, and social class. Overall women gave significantly more DK responses, as did the older respondents and those in the “lower” social class categories.

For correct responses for Thatcher, the only significant predictor was social class, the “higher” social classes being more accurate. For example, over 30

by an analysis of the proportions themselves. Where the proportion giving the correct answer, and therefore the proportion telescoping, is approximately equal across groups the two analyses will of course lead to the same conclusion. With our data, the principal outlying group consists of older (75 years and over) respondents, who have a substantially lower proportion of correct responses. However, as they more than compensate with an exceptionally high level of DKs, the absolute proportion telescoping is similar to that in the other subpopulations. In any case we would recommend that the results of the logistic analyses should be checked against the observed proportions as part of the interpretation.

**Table 3.** Logistic Regression Showing the Betas and Standard Errors

	Thatcher's Resignation						Hillsborough Disaster					
	DK		Correct		Forward Telescoping		DK		Correct		Forward Telescoping	
	Beta	SE	Beta	SE	Beta	SE	Beta	SE	Beta	SE	Beta	SE
Gender:												
M1	.378	.133	-.126	.129	.407	.11	.514	.157	-.592	.157	.263	.11
M2	(.449)	(.139)	(-.129)	(.130)	(.389)	(.110)	(.592)	(.130)	(.545)	(.159)	(.265)	(.112)
Age:												
M1	.014	.004	-.01	.004	-.021	.003	.016	.003	-.025	.005	-.01	.003
M2	(.018)	(.004)	(-.010)	(.004)	(-.020)	(.003)	(.021)	(.003)	(-.029)	(.005)	(-.009)	(.003)
Class:												
M1	.197	.047	-.306	.051	-.004	.041	.147	.042	-.157	.058	-.025	.041
M2	(.045)	(.520)	(-.248)	(.052)	(-.014)	(-.042)	(.089)	(.045)	(-.143)	(.059)	(-.027)	(.041)
Chi-square M1												
(gender, age, and social class)	46.78	(3)	44.12	(3)	59.08	(3)	63.97	(3)	54.75	(3)	14.02	(3)
Chi-square change for M1 with memory												
quality questions as covariates	38.22	(3)	32.75	(3)	54.20	(3)	69.38	(3)	61.18	(3)	14.56	(3)

NOTE.—M1 = model 1: The predictors of the dependent variables DK, Correct, and Forward Telescoping are gender, age, and social class. M2 = model 2: Betas and standard errors are in parentheses. The three memory quality questions were added to model 1 as predictors.



percent of the respondents in the “professional” class gave the correct month, while for the “unskilled” only 9 percent were correct. The percentage of correct responses also varied for Hillsborough. By far the largest effect was for gender; men’s estimates were more accurate. For men there is a consistent decline in accuracy with age; for women there is no clear pattern. There is also a significant difference ( $\chi^2(1) = 10.79, p = .001$ ) in accuracy between males and females in the younger age groups (16–44 years), a difference that attenuates with age and disappears for those over 45 years. Social class was also related to accuracy; more correct responses were found for those in the higher social classes.

A tendency to forward telescope was observed for Thatcher’s resignation: for every three who backward telescoped, four forward telescoped. The mirror image was observed for Hillsborough: for every three forward telescopers there were four backward telescopers. For both events, men were less likely to forward telescope the date, as were the older respondents. Overall, the amount of forward telescoping as a proportion of total error varied significantly by gender and age for both events, but not by social class.

Now we consider similarities in the responses across the two landmarks. To what extent did respondents treat them independently? As all respondents were first asked about Thatcher and then about Hillsborough we must allow for the possibility of dependence introduced by the research design. Overall, 10 percent of the entire sample offered “don’t know” responses for both events: over two-thirds of the people who gave a “don’t know” response for Thatcher also gave a “don’t know” response for Hillsborough. Similarly, of those who backward telescoped Thatcher, 50 percent also backward telescoped Hillsborough. In comparison only 35 percent who did not backward telescope Thatcher backward telescoped Hillsborough.

It would be interesting to establish whether there are respondents whose temporal estimations follow a consistent pattern, for example, consistent forward telescoping. For this, however, it would be necessary to use a broader range of events and an experimental design that provided buffers between successive dating questions. On the basis of our design, for the two events investigated in this study, it appears that DK responses are more common for women, older people, and those in the lower social classes. Women and younger respondents are more likely to forward telescope the date of the event than male and older respondents.

Model 2 allows us to determine whether the observed effects of age, sex, and social class persist when differential memory quality is taken into account. To put it another way, is accuracy simply a matter of differential salience of the landmark events? Since sociodemographic characteristics are generally used in the presentation of results, if sociodemographic differences are explicable in terms of memory quality, a recommendation for survey designers might be made to include memory quality information as part of any such comparisons.

While memory quality, as measured by our three questions, accounted for a significant amount of the variability in responses, this explanation was largely independent of the association of dating accuracy and sociodemographics (see table 3). All the significant sociodemographic effects persisted for Hillsborough although the effect of class on DKs was substantially smaller; for Thatcher, one coefficient was attenuated to nonsignificance (class and DK), and one coefficient became significant (age and correct). Thus sociodemographic differences in the dating of the landmark events are not merely a result of differential memory quality; other explanations must be sought for group differences in dating accuracy.

## Implications

It has long been recognized that errors of temporal estimation pose a threat to the reliability of survey data. In particular the tendency to displace events in time, either forward or backward, affects survey quality by introducing the possibility that a methodological artifact may confound substantive differences. While much research has looked at relatively mundane events, some researchers (Auriat 1993; Loftus et al. 1992) have investigated more consequential episodes. Loftus et al. suggest that "landmark" events may provide robust anchoring that will improve the accuracy of reporting by standardizing the reference period. If errors in temporal estimations of landmarks or other events were essentially random, this would merely increase error variance, and the sample estimates would still be unbiased estimates of the population values. However, systematic error patterns across the population could make the estimates biased; for example, a tendency for forward telescoping of landmarks would decrease estimates of behavioral frequencies. Furthermore, since exploring group differences is the primary purpose of much survey research, differences in error patterns related to gender, age, and/or social class are of particular concern.

Just as the eruption of Mount St. Helens was a good choice for a landmark event for Washington State residents (Loftus and Marburger 1983), Thatcher's resignation and the Hillsborough disaster were, at the time, the best examples we could find for a survey in Britain. Had they been used for this purpose the level of inaccuracy in dating these landmarks could have biased the resulting estimations of target behaviors under consideration. The logic of the landmark technique is that people will be more accurate reporting a target event, such as hospitalization, with reference to a landmark rather than some other arbitrary date or time period. It follows that if both the target and the landmark events were telescoped equally, then there would be no bias. Suppose, however, that the target events were not telescoped but the landmarks were. Hillsborough, with its backward telescoping, would increase counts of

the target behavior, while the forward telescoping of Thatcher's resignation would decrease the counts.

There were also significant differences in the error patterns among subpopulations for our data. For example, women were somewhat more likely to forward telescope the dates of the two landmark events. Furthermore, there were significant effects for age and social class. Each of these subpopulations was associated with significant differences in dating accuracy and directional bias. The differences we observed would lead to seriously distorted comparisons for target behaviors among subpopulations in a survey context. This illustrates the importance, if landmark events are to be used to set boundaries for recall, of selecting events that are not likely to have differential dating accuracy for respondent comparison groups. In our research we measured for each landmark three aspects of memory quality, but the sociodemographic differences remained when these memory quality variables were included as covariates, even though the memory quality questions were related to the quality of responses.

The way people make temporal estimations is complex, relying on several cognitive systems (see Friedman [1993] for a review; Huttenlocher, Hedges, and Bradburn [1990] for examples). The present research raises some critical questions about the use of landmark events to establish temporal reference periods for retrospective questions in surveys. Given the observed error levels and the systematic subpopulation differences, Loftus and Marburger's (1983) warning that the landmark event needs to be "perfectly anchored among all target population groups" (p. 119) should be heeded.

## **Appendix**

### **The Questions Used for Thatcher's Resignation**

These are the four questions concerning Thatcher's resignation (differences for Hillsborough are indicated in parentheses; response alternatives are listed in brackets).

We would like to get an idea of how well people can remember events. I am going to ask you about two events in the past, to see how well you remember them. The two events are: Margaret Thatcher's resignation as Prime Minister, and the Hillsborough football disaster.

1. How clearly can you remember Margaret Thatcher's resignation as Prime Minister (the Hillsborough football disaster)?

[Responses were recorded on a 5-point scale from "I can't really remember it" to "I can remember it vividly."]

2. At the time, how important an event did you think Margaret Thatcher's resignation as Prime Minister (the Hillsborough football disaster) was?

[Responses were recorded on a 5-point scale from "extremely important" to "not important at all."]

3. For this next question, we are not interested in how good or bad you think the

event was, just how strong your reaction to it was. In terms of your feelings, how strong was your reaction to Margaret Thatcher's resignation?

(In terms of your feelings, how strong was your reaction to the Hillsborough football disaster?)

[Responses were recorded on a 4-point scale from "I didn't really have any feelings about it" to "I felt very strongly about it."]

4. In which month and year would you say Margaret Thatcher resigned (the Hillsborough football disaster happened)?

[Probe if not informative enough to code.]

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