Journal of Official Statistics
Vol. 3, No. 3, 1987, pp. 267–282

Attrition in a Panel Study of Attitudes

Jennifer Waterton and Denise Lievesley[1]

Abstract: An extensive literature exists on the problems of nonresponse in panel studies where factual and quasi-factual information is collected. The effects of attrition in a panel study of attitudes are less well documented.

This paper describes a four-wave annual panel study of social attitudes in Britain. The response rate and the factors which affect it are discussed in detail. A profile of continuing panel members is drawn and this profile is compared with findings from other longitudinal surveys. Special attention is given to the likely effects of attrition on the proportions answering "Don't know." Finally, the effects of a post-stratification weight to compensate for differential nonresponse are assessed and some recommendations are made for its use.

Key words: Attitude survey; nonresponse; attrition; response rates; panel surveys; post-stratification.

1. Introduction

In spring 1983, the first of an annual series of surveys about social attitudes in Britain was launched. The design, fieldwork, and preliminary analysis are done by Social and Community Planning Research (SCPR), a non-profit making research organization.[2]

The face-to-face interviews, conducted with fresh random cross-sectional samples each year, concentrate upon attitudes, values, and mores for a wide range of social issues. Data on key topic areas (including attitudes to government spending, the economy, defence issues, and sexual morality) are collected each year, together with demographic details. Other topics such as attitudes to the environment, the National Health Service, crime, sexual equality, new technology and so on are asked on a more irregular basis. The target population for the survey series is all adults aged 18 years or over living in households in Great Britain.

The motivation for the series was largely the paucity of data relating to the British public's attitudes, values, and beliefs contrasted to the depth of coverage afforded to factual surveys

[1] Denise Lievesley is Assistant Director at the Survey Methods Centre, Social and Community Planning Research (SCPR), London, and Jennifer Waterton is a Statistician at the Post Office Headquarters in London (but conducted this research while employed by the Survey Methods Centre at SCPR).

[2] Core funding for the series is provided by the Sainsbury foundation with supplementary funding provided by a number of government departments and other bodies.

of social conditions and behaviour patterns. Although over the years many ad hoc polls and surveys of attitudes to one issue or another have been conducted, these have served to frustrate researchers whose interests are in the field of social change – since their methods, designs, coverage, and so on have been too inconsistent to allow anything but a fragmented picture to emerge. So, the current series was devised – at least in part – with the U.S. General Social Survey in mind. That data source has proved invaluable to researchers from a wide range of academic disciplines (see Davis, (1982)) and the British Social Attitudes Survey is finding a similarly wide audience.

The primary objective of the survey is to provide a series of profiles of public attitudes in the 1980s. Almost as important, however, is its function in monitoring trends and changes in attitudes over time. This second objective would perhaps be better served by a panel design than by a series of cross-sections, since changes could then be charted not only at an aggregate but also at an individual level. However, the lack of literature on the conditioning effects on a panel study of attitudes, the fear that attrition might be severe (particularly given the lack of one easily identifiable survey objective), and the conflicting demands for reliable annual cross-sectional estimates resulted in a decision to conduct the series with fresh random samples on each occasion. There have now been four rounds of the series. Preliminary results and commentary from the survey are published about a year after the fieldwork has been completed (see Jowell and Airey (1984); Jowell and Witherspoon (1985); and Jowell et al. (1986)). The data are lodged in a data archive where they are accessable for researchers.

Nevertheless, the repeated cross-sections design was acknowledged to have serious limitations. For this reason additional funding was obtained from the Economic and Social Research Council to explore the methodological and analytical implications of taking a panel approach. Thus for the four years, 1983 to 1986, the Social Attitudes Data Base consists of a larger cross-sectional survey and a smaller panel survey.

The content of the two questionnaires in any given year is similar, but not identical. Any questions included in both surveys are asked in identical form. The fieldwork periods for the two components coincide approximately, taking place between March and May each year.

2. Survey Design and Response

The response rates for the annual cross-sectional series are presented in Table 1.

Table 1. Response Rates for Cross-Sectional Surveys

	1983	1984	1985	1986
Eligible sample	2 532	2 407	2 450	4 454
Non-response: Refusal	565	567	472	1 008
Non-contact	105	89	118	189
Other non-response	101	76	56	157
Interviews achieved	1 761	1 675	1 804	3 100
Response rate	70%	70%	74%	70%

These response rates are not untypical of those achieved by SCPR for a general population survey with no single identifiable purpose and a number of funders. The largest component of non-response is refusals, accounting for around 20 % of the total sample.

The design of the 1983 cross-sectional sample is relevant to the discussion since the panel was selected from it. In 1983, a stratified random sample of 114 polling districts[3] was selected with probability proportional to the electorate. In each selected polling district twenty-three addresses were selected at random with probability proportional to the number of electors registered. One adult was chosen from each address using a Kish random selection grid (Kish (1965)). Although this procedure does not result in equal probabilities of selection, only a minimal amount of corrective weighting is required.

This cross-sectional sample constituted the basis for selecting the panel sample. A random sample of 769 individuals (referred to in the text as the "1983 panel") was drawn from those who responded to the 1983 survey. Table 2 traces these 769 individuals from their

Table 2. Attrition in the Social Attitudes Panel Survey

	1984	1985	1986
A Selected for panel	769	602	470
B Refused interview in advance (i)	43	22	6
C Issued sample (selected for panel – advance refusal)	726	580	464
D Attrition – inevitable (dead, emigrated, etc.)	11	11	7
E Attrition – non-contacts	27	12	1
F – refusals	85	55	12
G – untraceable	33	22	4
H – other nonresponse	17	14	8
J Successful interviews	553	466	432
Response rate $\frac{J}{A-D}$ (ii)	73%	79%	93%
Cumulative response rate (iii)	73%	62%	58%

(i) At each wave of interviewing, respondents were asked whether they would agree in principle to being contacted the following year.
(ii) The response rate, in any given year, is defined as the number of successful interviews divided by the number selected for the panel minus the losses through death and emigration. Thus we have assumed that none of those we failed to contact had died or emigrated.
(iii) The cumulative response rate is defined as the number of successful interviews in a given year divided by 769 minus the cumulative losses through death and emigration.

response in 1983 through all subsequent stages to 1986.

A few remarks are relevant to the interpretation of Table 2. The response rates quoted here are sensitive to small alterations in the definition of the denominator. For this reason the absolute figures are of less interest than the trend which emerges. Broadly speaking round two of the panel (in 1984) suffered similar attrition rates to the nonresponse recorded for the cross-sections (just under 30 %). At round three, in 1985, the position was somewhat improved (20 % nonresponse) and at round four, in 1986, the losses are very small indeed (about 5 %).

In 1985 and 1986, a number of nonrespondents to the previous round were re-issued. The cases for re-issue were selected on the basis of the reason for the nonresponse. (This selective re-issuing was carried out in order to bolster the size of the panel sample.) Given

[3] Polling districts are administrative areas which contain, on average, 1 200 electors.

the low success rates for these cases (about one in three were achieved) they have had a detrimental effect on the response rates given in Table 2. In particular, the refusals category will appear high in 1985 and 1986 since it includes many of the re-issued cases.

The refusals category contains both those who refused because they simply did not wish to continue as a panel member and also those whose circumstances (for instance their health or a family incident) would not permit an interview at that time.

With these caveats in mind, however, and taking into account the initial nonresponse to the 1983 survey, the cumulative response rate is only 41 % – (i.e. 70 % x 58 %). So, although the year-on-year response never falls below 70 %, the cumulative effect over a four year period is severe.

A number of points which relate to fieldwork strategy, contact procedures and ways in which co-operation was improved are discussed in the next section.

3. Maintaining Response

One of the aims of this methodological study was to investigate the effects of attrition on a panel study of attitudes. Great effort was expended in attempting to maintain satisfactory response rates. The measures taken included the following.

(i) In 1983, contact information for those willing in principle to be re-interviewed was requested. This usually took the form of an address or telephone number of a relative, friend, employer or a neighbour who would be likely to know of the respondent's whereabouts if he or she moved. At each subsequent interview this was checked and additional information was sought. The information collected proved to be of vital importance. Unfortunately we were still unable to trace 59 (8 %) of the original sample (see row G of Table 2).

(ii) At the time of each interview, respondents were given reply-paid postcards to fill in and return to the field office if they changed address. Over the course of the study, some 30 of these were received.

(iii) Whenever a non-response was recorded, interviewers submitted an explanation of the reasons and circumstances for the nonresponse. They were also asked to assess the probability that a different interviewer returning in a few weeks would be able to carry out an interview. This information was collated, processed, and used to decide whether a name should be re-issued – both after a few weeks in the same year and in the following year. Of the re-issued nonrespondents about one-third were successfully interviewed the following year.

(iv) Although people in institutions were not part of the target population for the 1983 cross-sectional sample, if panel members moved into an institution they were interviewed if willing. This gives rise to a small discrepancy in the definition of the target populations for the panel and successive cross-sectional samples.

(v) As far as possible, the same interviewer returned to the same respondents. This strategy is generally thought to improve response rates (though we were unable to find supporting evidence in the literature). Our results seem to be consistent with the view that the strategy is beneficial – response rates were three percent higher when the same interviewer returned – but we have to acknowledge that this was not an experimental comparison.

(vi) A large number of personal letters were written by the project supervisors to individual panel members. These were particularly useful in cases where interviewers had reported some reluctance to participate.

(vii) New Year cards were sent to panel members each year. These were designed to be identified with the study and to promote

interest and feelings of membership. Inside, a short summary of the progress of the survey was printed, with a reminder that the interviewer would be returning in the spring.

(viii) A flexible approach to interviewing was adopted. For respondents who had moved to a part of the country where no interviewer was located, telephone interviews were carried out by the research team.

On the other hand, one of the procedures may have had a detrimental effect on response rates. Each year, at the end of an interview, interviewers asked for permission to return the following year (see row B of Table 2). Where permission was not forthcoming, no further attempts were made to contact the respondent in any subsequent round. Although it was recognized that this would be likely to decrease response rates, it is the policy of Social and Community Planning Research which believes that respondents should be made aware of any prior intention to call. (For a discussion on the conflict between the rights of the individual and the quality of the data see Jowell (1986)).

Response rates from panel studies differ according to a wide range of variables such as the aim of the survey, the type of sampling unit, the sample design, the fieldwork strategy, the target population, the length of the questionnaire, the time elapsed between contacts, the data collection mode, the country of administration, the acceptability of proxy information and so on. Comparability with other longitudinal studies is hard to establish since at least one and usually many of these variables differ, and also because response rates themselves are open to variable definition.

In Britain, one of the best known longitudinal studies is the National Child Development Study which has followed the progress of a birth cohort born in the first week of March 1958, (Fogelman (1983)). At the most recent round, in 1981, responses were obtained from 76 % of the original sample. This high response rate reflects the relative ease of maintaining contact, response and interest in a high profile study which has generated substantial media attention. Another, rather different, continuing survey in Britain is the Labour Force Survey. Respondents are interviewed on five occasions over twelve months. The most recent response rates available (Social Survey Division, OPCS, Annual Report 1984/85) record initial response rates of 82 % decreasing to 73 % of the target sample by the fifth interview. The high response rates may be explained in part by the fact that any responsible adult can provide the information for a household.

A similar survey in Canada, the Canadian Labour Force Survey, manages to maintain a 95 % response rate with repeated interviews over a six month period. This is an impressive achievement but is at least in part due to the Canadian Statistics Act which puts a legal requirement on selected respondents to participate.

Examples of panel studies in the U.S. abound (see Duncan and Kalton (1985)). Again attitudinal panels are not well represented so comparisons tend to show this study in an unfavourable light. Response rates for the annual Panel Study of Income Dynamics (Survey Research Center (1984)), however, are not too dissimilar from our own. This large survey of economic variables registered a response rate of 71 % in the first year (1968), 86 % of the remainder in 1969 and 97 % or thereabouts for each subsequent year.

In conclusion the response rates recorded here, which may at first sight seem rather disappointing, do not compare unfavourably with other longitudinal studies especially when the precise nature of our survey is taken into account.

4. Differential Attrition

Erosion of a panel over time might not be a problem if it was evenly spread across all demographic, behavioural, and attitudinal subgroups. Unfortunately, in practice, the pattern of attrition is not like this; particular subgroups (the elderly, the mobile, the uninterested and so on) are lost in disproportionately large numbers.

Using the social attitudes panel study, we have taken the opportunity to examine the extent and nature of the attrition. In 1983, 233 questions were asked of all or almost all respondents to the survey. These questions have been classified as demographic (22) or attitudinal (211). A list of the questions included in the demographic category appear later in this paper. (The attitudinal category includes a few "behavioural" measures, for example, newspaper readership and political participation in addition to the attitude questions covering education, health, sexual morality, sexual equality, etc).

Our approach has been to examine the differential attrition from 1983 to 1984, from 1983 to 1985 and from 1983 to 1986. This seemed more appropriate than examining the year-on-year attrition since individuals may drop out from one wave but re-appear at the following interview. For each wave unconditional tests[4] were performed to test whether differences between the continuing panel and those who had dropped out could be attributed to random attrition. The significance level for the tests was set at 5 %. While recognizing the arbitrariness of the testing procedure, particularly in relation to the choice of significance level, it is instructive to look at the pattern which emerges over time.

Results are presented first for the demographic variables in Table 3.

Table 3. Attrition on Demographic Questions

	Number of demographic questions showing differential attrition
1983–1984	9
1983–1985	8
1983–1986	11
Total number of demographic questions	22

Table 3 shows that, there is differential attrition on nine of the 22 demographic variables at the first re-interview. At the second and third re-interviews the numbers are eight and eleven respectively. Not surprisingly, there is, considerable overlap between the questions which display differential attrition in each of the three comparisons: 1983–1984, 1983–1985, and 1983–1986. This is brought out more clearly in Table 4 which shows the extent of the overlap and the differences between the continuing panel and those who drop out in each of the three subsequent re-interviews.

Table 4 does not permit one to distinguish between variables for which attrition compounds over time and those for which attrition is differential at the first re-interview but evenly distributed across categories on subsequent occasions. Further analysis has focussed on this aspect. The variables for which attrition appears to compound over time are: age at completing full-time education, personal income, social class, household type, age, tenure, and employment status. For the remaining variables attrition does not appear to compound over time. Both of these patterns are illustrated in Table 5. Age is given as an example of compounding attrition (note that the age distribution between 1985 and 1986 does not alter because of the tiny losses from the panel in 1986). Party identification is given as an example of where the effects do not compound at subsequent interviews after the first.

[4] The tests do not assume that the number of respondents (and nonrespondents) is fixed.

Table 4. Comparison of the Initial Panel with the Achieved Panel after One, Two, and Three Years

Demographic items showing significant differential attrition	Subgroups overrepresented in continuing panel	Subgroups underrepresented in continuing panel
All 3 years		
Employment status	Employed	Retired, sick, students
Tenure	Owner-occupiers	Local authority renters
Gross household income	Higher income	Lower income, those refusing to answer
Age	18–59	Over 60s.
Party identification (two measures)	Liberal/SDP Alliance	Non-aligned
Household type	Families with young children	Pensioner households
2 years out of 3		
Race (1983–1984, 1983–1986)	White	Non-white
Social class (1983–1985, 1983–1986)	Non-manual	Manual, unclassifiable
1 year out of 3		
Personal income (1983–1986)	Higher income	Lower income
Marital status (1983–1984)	Married	Widowed
Age at completing full time education (1983–1986)	16–19	< 15

Items with *no* differential attrition in any of the three years:
Number of calls to obtain interviews
Trade Union membership
Private health scheme membership
Metropolitan/non-metropolitan
Region of residence
Hours worked
Employee/self employed
Religion
Sex
Party identification (strong supporters only)

Table 5. An Example of Compounding (Age) and Non-compounding (Party Identification) Differential Attrition

Age in 1983 over the four waves:

Achieved sample in	18–29	30–44	45–59	60+
1983 (%)	21	28	23	28
1984 (%)	22	29	25	24
1985 (%)	23	31	25	21
1986 (%)	23	31	25	21

Party identification in 1983 over the four waves:

Achieved sample in	Con.	Lab.	Lib/SDP/All.	Other	None
1983 (%)	42	34	13	1	10
1984 (%)	43	32	16	1	8
1985 (%)	43	32	16	1	8
1986 (%)	43	32	17	1	8

Analyses equivalent to the above have been undertaken on the effects of attrition on attitudinal variables. As in the case of the demographic variables, differential attrition has been examined from 1983 to 1984, from 1983 to 1985 and from 1983 to 1986. At each wave, panel respondents have been compared with panel nonrespondents on the basis of their answers given in the 1983 interview. This avoids confusing the effects of attrition with other possible explanations of differences. The summary table for the attitudinal items, (equivalent to Table 3 for the demographic items) appears below.

Table 6. Attrition on Attitudinal Questions

	Attitudinal questions showing differential attrition	
	Number	%
1983–1984	64	30
1983–1985	72	34
1983–1986	68	32
Total number of attitudinal questions	211	100

Again, there is considerable overlap between the questions which display differential attrition in each of these comparisons. Indeed, overall about half of the items (110) show no differential attrition on any of the three occasions. It is not feasible to provide an exhaustive listing of subgroups which suffer excess attrition on the attitudinal items. However, some general points can be made.

(i) Overall, the attitudes which do discriminate between those who drop out and those who continue are related to attitudes which discriminate between libertarians and conservatives. The continuing panel members are much more tolerant, particularly in their views on freedom of speech and sexual behaviour. They are also less likely to register disapproval than those who withdraw. This is partly, but not entirely, explained by the fact that more of the older age groups – who hold more stringent moral views – are lost.

(ii) Those who continue are likely to be more politically active than their counterparts who withdraw. Since the analysis refers to responses in 1983, this cannot be due to conditioning.

(ii) Those who continue are likely to hold firmer views. This conclusion has been reached on the basis of the proportions who answer "Don't know" (DK). This point is discussed in detail in the next section. The finding is that those who answer DK are more likely to drop out of the panel than those who do not. If we remove all those who answered DK in 1983 before assessing whether or not differential attrition has occurred, the number of attitudinal items with differential attrition drops considerably – from 64 to 46 in 1984, from 72 to 49 in 1985 and from 68 to 39 in 1986.

The profile of the non-responding group in terms of their demographic and their attitudinal characteristics is consistent with evidence from other studies most of which have focussed on non-attitudinal information. The findings on age, race, income, and answering DK are universally upheld while the remaining discriminators found in the present study mostly echo findings from previous research (see Parnes (1972); Powers and Bultena (1972); Streib (1966); Goudy (1976); U.S. Department of Labor (1974); Eckland (1968); Singer et al. (1976); Sobol (1959); and Lazarsfeld (1941)).

The findings presented so far in this section relate to differential nonresponse on univariate distributions only. This is in common with most other research on this subject. However, we have taken our examination of nonresponse one stage further and considered

whether, in addition to the univariate effects found, there is any evidence of interactions between variables in their effect on response. It is impossible, given the plethora of possible interaction effects ((233 x 232/2) = 27 028) to examine this phenomenon in a comprehensive fashion. Therefore, the approach which has been adopted is to restrict attention to demographic items, moreover to demographic items which do show significant attrition on a univariate basis in all three years. Seven demographic items satisfy these criteria. These are (from Table 4) tenure, age, political identification (two variables), household type, income, and employment status. Given the similarity of the two political partisanship variables, only one has been selected. These six variables have then been examined in all possible combinations of two (15 in all) using logistic regression (McCullagh and Nelder (1983)). The purpose is to see whether there are interaction effects in addition to the main effects operating in determining the proportion who remain in the panel in any given cell of the two-way classification. Of the 15 regressions considered, seven showed significant interaction effects in addition to the main effects already identified. The seven interaction effects which are significant are tenure, age and household type by party identification; employment status and tenure by age; tenure and household type by income.

The presence of these interactions has implications for the choice of a suitable weighting scheme. This is discussed further in Section 6. First, we examine in more detail the relationship between attrition and giving the answer "Don't know."

5. How Attrition Affects the Proportion Answering "Don't Know"

One of the most striking differences between the distributions on the questions asked of both the panel and the fresh cross-sectional sample in 1984 was in the much lower percent replying DK by the panel sample. This is apparent from Table 7 which displays the frequency distribution for 96 attitudinal questions asked of all respondents to both the 1984 surveys.

The table shows substantial differences between the two distributions. If the differences are calculated on a question-by-question basis a similar result is found – the median difference is 1.5 %.

Table 7. Frequency and Cumulative Frequency Distributions for DK Responses

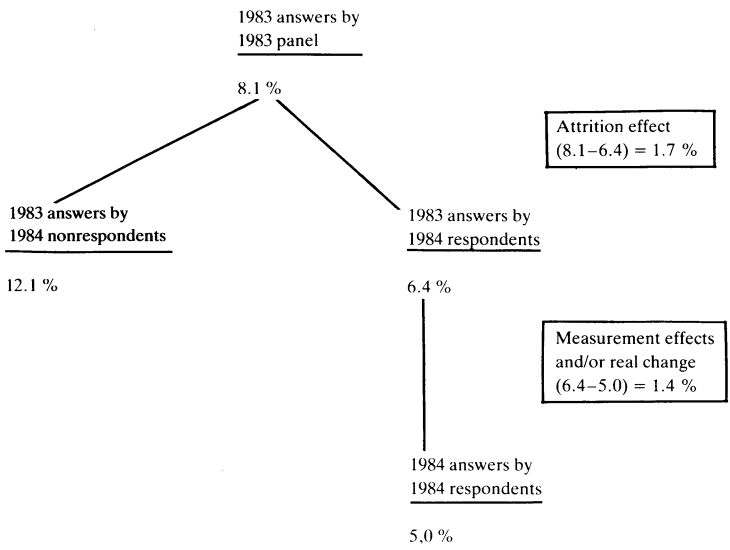
% Replying DK	Number of questions		Cumulative frequency distribution	
	panel 84	cross-section 84	panel 84	cross-section 84
0.0–0.9	40	15	40	15
1.0–1.9	16	20	56	35
2.0–2.9	12	15	68	50
3.0–3.9	13	5	81	55
4.0–4.9	1	10	82	65
5.0–5.9	4	5	86	70
6.0–6.9	1	5	87	75
7.0–7.9	3	6	90	81
8.0–8.9	1	3	91	84
9.0–9.9	1	2	92	86
10–	4	10	96	96
Total	96	96	96	96
Median (%)			1.4%	3.0%

There are four possible sources for these observed differences: sampling variability, differences in the target populations, panel attrition, and panel conditioning. The first of these explanations cannot be ruled out but seems unlikely given that the panel and cross-sectional samples had identical patterns of DK answering in 1983. The second explanation arises from the marginally different age structure of the two samples (no 18 year-olds are included in the 1984 panel sample) and the policy, described earlier, of following people into institutions when possible. These differences are so small that we are justified in ignoring them. So the two most likely explanations are panel attrition and panel conditioning. (Panel conditioning is said to occur when the very act of being interviewed changes attitudes or behaviour, or more likely, changes the reporting of attitudes or behaviour. (See for example Traugott and Katosh (1979); Buck et al. (1977); Bridge et al. (1977)).

This argument may be taken one stage further. In cases where a question has been asked in 1983 and 1984 of the panel samples, any observed difference between the percentages replying DK on the two occasions may be separated into two parts: the difference due to attrition and the difference due to measurement effects and/or real change. Moreover, if the question was also asked on the two cross-sectional surveys then the measurement effects may be disentangled from those of real change. This aspect of the analysis is not considered here, but is discussed in a separate paper on the Social Attitudes Panel (Waterton and Lievesley (1987)).
ton and Lievesley (1987)).

The way the argument proceeds is illustrated with reference to the question "Do you think Britain should remain in NATO or should it withdraw?" which was asked of both the 1983 and the 1984 panel.

In 1983, the percentage replying DK was 8.1 %. In 1984 this fell to 5 %. The 1983 panel may be divided into two groups – those who remained in the panel in 1984 and those who dropped out. For these two subgroups, the percentages replying DK in 1983 were 6.4 % and 12.1 % respectively. So, of the overall fall (3.1 %) in DK answering, we estimate that 1.7 % (8.1 % – 6.4 %) is due to attrition while the remaining 1.4 % (6.4 % – 5.0 %) is due to a combination of measurement effects and real change. This is illustrated pictorally below.



Of the 96 questions which appear in Table 7, only 50 were asked in both years, so the analysis described above must be confined to these. There was a small but consistent drop in DK answering by panel members in 1983 and 1984; 48 of the 50 questions registered a drop in DKs. The average number of DKs per question fell by 0.84 % of which the majority (0.62 %) could be attributed to attrition.

6. Weighting to Adjust for Differential Attrition

In this final section, the decisions about and implications of the weighting procedure adopted to compensate for the differential nonresponse are discussed.

Given the findings about differential nonresponse described in Section 4, it was decided that some kind of weighting adjustments should be applied. Many alternative strategies for post-stratification are possible and a good discussion is given by Duncan and Kalton (1985) and Kalton (1986). The two most common strategies in this situation are the following.

1. To weight successive panel samples (in 1984, 1985, 1986) to the profile of the 1983 panel sample.
2. Or to weight successive panel samples to some reference distribution.

Although the first alternative allows great flexibility in the choice of weighting variables (any of the 233 questions discussed earlier would be possible candidates). The second procedure was adopted, and successive panel samples were post-stratified to make them conform to the 1983 population distribution in terms of region (in eleven groups), age (in four groups), and sex.

There were two main reasons for adopting this approach. The first was that the original cross-sectional sample from which the panel was selected was known to suffer from marked regional nonresponse biases. This was due largely to the low response rates in inner London and other metropolitan districts. The second reason is that a long-term aim of this methodological project is to combine the cross-sectional and the panel data. This should be done in a way that provides more efficient estimates of change than would be possible with either set used on its own. Therefore, a single reference distribution to which all panel samples and all cross-sectional samples could be weighted seemed desirable.

The choice of weighting variables was, of course, restricted to those for which population information was available. Region was chosen for the reason already stated. Age and sex were included because they are important determinants of attitudes. Age in particular suffered both initial nonresponse bias and subsequent attrition as shown in Table 8.

Table 8. Age Distribution of the Target Population and the Panel Samples (Percent)

Age group	18–29	30–44	45–59	60–
Population	24	26	22	28
Panel sample 1983	21	28	23	28
1984	22	29	25	24
1985	23	31	25	21
1986	23	31	25	21

From the table it is apparent that the initial nonresponse bias was caused by too few respondents in the youngest age group, while subsequent attrition was disproportionately greatest in the older age group.

The initial nonresponse bias and subsequent differential attrition on sex was not significant at the 5 % level. Nevertheless, given the centrality of this variable as an explanatory variable in many analyses, it was decided that it should be included in the weighting adjustments.

Thus the weighting performs three functions. It compensates for initial nonresponse biases on age and region. It adjusts for subsequent differential attrition of the age distribution and it adjusts for the aging of the panel (and also for any period effect) since the age distributions of successive panels were weighted to the reference distribution. The main effect of this is that younger respondents are given larger weights as time goes by. In 1986, only respondents aged 21–29 still belong in the youngest age group (18–29).

With these weights attached it is instructive to examine how other items are affected. In particular, since many of the items which show differential attrition are related to age, one might hope that by adjusting for age, attrition on these other variables might also be reduced. We may now distinguish, both the four unweighted samples and their four weighted counterparts. The following question is now to be addressed. Are the differences between successive post-stratified panel samples (in 1984, 1985 and 1986) and the post-stratified panel sample of 1983 greater than would be expected because of random variation? The summary findings, equivalent to Tables 3 and 6 appear in Table 9.

Combining the information given in Tables 3 and 6, we can obtain the analogous results for unweighted data, and we find that significant differential attrition occurred in 31 % (for 1983–84), 34 % (for 1983–85) and 33 % (for 1983–86) of questions. Thus, on balance, the weighting adjustments do not seem to have resulted in improvements over the unweighted sample in terms of reducing differential attrition. However, this comparison masks different findings for the demographic and the attitudinal questions.

Twenty-two demographic items were examined. Half of these displayed no differential attrition over the lifetime of the panel (1983–86) regardless of whether the weighted or unweighted data are considered. Eleven items displayed significant differential attrition on unweighted data, but for seven of these the weighting scheme seemed to compensate for differential attrition – see Table 10.

Table 9. Attrition from the Panel Using Weighted Frequencies

	1983–1984	1983–1985	1983–1986
Questions showing significant differential attrition:			
Demographic questions	8	5	4
(Base)	(22)	(22)	(22)
Attitudinal questions	82	86	90
(Base)	(211)	(211)	(211)
As a % of all questions	39%	39%	40%
(Base)	(233)	(233)	(233)

Table 10. Attrition from Panel Using Weighted and Unweighted Frequencies – Demographic Questions

	1983–1984	1983–1985	1983–1986
Questions showing significant differential attrition:			
Unweighted and weighted	6	5	4
Unweighted only	3	3	7
Weighted only	2	0	0
(Base)	(22)	(22)	(22)

Table 11. Attrition from the Panel Using Weighted and Unweighted Frequencies – Attitudinal Questions

	1983–1984	1983–1985	1983–1986
Questions showing significant differential attrition:			
Unweighted and weighted	55	54	57
Unweighted only	9	19	11
Weighted only	27	31	33
(Base)	(211)	(211)	(211)

For attitudinal data, however, the weighting adjustments seem, on balance, to be detrimental. Focusing upon 1983 – 86 (though the picture is similar for 1983 – 84 and 1983 – 85), we find that eight out of the ten questions give the same results with respect to differential attrition for weighted and unweighted data. In 16 % of the questions, the weighted data produces significant differential attrition where none is apparent for unweighted data. This contrasts with 5 % of questions where weighted data does not produce significant attrition.

This type of post-stratification is commonly employed in panel surveys. Our experience is that gains from adjusting for differential attrition do not necessarily accrue from the weighting procedure and are possibly less likely to accrue for attitudinal than demographic data. We should recognize, however, that we have only examined attrition from the 1983 panel and that the post-stratification may have reduced bias due to the initial non-response.

Given the findings of Section 4 with respect to interactions between age and party identification, employment status, and tenure in their effect on attrition, it could be argued that if age is to be used as a weighting variable, then party identification, employment status, and tenure should also be included in the set of weighting variables. In practice, this would not be possible, since the requisite population information is not available.

Of course, in theory, it is possible to construct two or more sets of weights and select the adjustment for the particular analysis being undertaken. In practice, though, this is a cumbersome, time consuming, and expensive procedure which is likely to lead to confusion. Thus the central dilemma is whether to adopt a procedure (as here) which adjusts the successive panel samples to reflect the population distribution at a particular point in time or

whether a procedure which weights successive panels to the original 1983 cross-sectional sample is preferable. The answer to this will depend on the purpose of the analysis. If comparability between the cross-sectional samples and the panel samples is paramount, or if inference to the given reference distribution is desirable, then the post-stratification procedure described here is probably justified. If the analysis is of an exploratory nature and if parameter estimates relating to the given reference distribution are not the object of the analysis, then the justification for weighting is less clear.

7. Discussion and Conclusions

In the foreword to the report of the first year's findings of the Social Attitudes Survey Sir Claus Moser wrote:

"What makes the series so important is precisely that it is a series. It is from the monitoring and understanding of trends in attitudes that one can learn most about what is happening in a society and this new series promises to be much more enlightening than findings from isolated and unrelated surveys." This focus upon trends in attitudes gave rise to powerful arguments in favour of returning to the same people each year. A panel survey can answer important questions that a cross-sectional study would fail to resolve, particularly about change at the individual level. Despite its analytic benefits, a panel approach may be subject to differential attrition which makes the sample unrepresentative, and it may also be subject to conditioning effects. For these reasons it seemed unwise to advocate a switch to a panel design for the entire study. Instead our proposal was for a small scale study which would enable us to test the effects of attrition and conditioning and to explore the analytic power of a panel design.

In Britain, our experience of running general population surveys on a topic as diffuse as social attitudes (with no single easily explained purpose or sponsor) is very limited both within Great Britain and more generally. It was anticipated that it would be difficult to achieve high response rates, particularly with gaps of a year between interviews. The lack of an incentive plan (difficult and expensive to implement in annual surveys) to encourage participation is also likely to depress response rates. In the event these worries were confirmed. The cumulative response rate (taking account of the initial nonresponse to the 1983 survey and subsequent losses from the panel) is now only 41 %. However, the panel members who still remain seem to be highly motivated and committed to the survey. Losses from the 1986 wave were minimal and we would expect response rates for subsequent waves of the survey to be maintained at about 95 %.

This panel study was planned as a methodological exercise to examine what levels of attrition (and conditioning) might be expected in repeat interviewing on attitudes. If it had been a longer term exercise, we would certainly have supplemented the panel sample to preserve a reasonable representation in the on-going sample and to avoid extreme weighting factors.

Despite the comparatively low response rates, the panel has proved a worthwhile adjunct to the survey series. A considerable amount of information is now available about the panel nonrespondents (obtained from earlier interviews) which permits a comprehensive assessment of the effect of attrition on the results so that appropriate adjustments may be made to any substantive conclusions drawn.

A number of researchers have outlined the analytic benefits of a panel design (see, for example, Plewis (1985); Duncan and Kalton (1985); Duncan and Morgan (1984)). Analysis of the Social Attitudes panel (early results of which appear in Lievesley and Waterton (1985) confirm our belief that these benefits far outweight any disadvantages.

8. References

Bridge, R.G., Reeder, L.G., Kanouse, D., Knuder, D.R., Nagy, V.T., and Judd, C.M. (1977): Interviewing Changes Attitudes – Sometimes. Public Opinion Quarterly, 41, pp. 56–64.

Buck, S.F., Fairclough, E.H., Jephcott, J.St.G., and Ringer, D.W.C. (1977): Conditioning and Bias in Consumer Panels – Some New Results. Journal of the Market Research Society, 19, No. 2.

Davis, J.A. (1982): Have We Learned Anything from the General Social Survey? Social Indicators Newsletter, No. 17.

Duncan, G.J. and Kalton, G. (1985): Issues of Design and Analysis of Surveys Across Time. Proceedings of the 45th Session of the International Statistical Institute Conference.

Duncan, G.J. and Morgan, J.N. (1984): Behavioural Research with the Panel Study of Income Dynamics in Retrospect and Prospect. Survey Research Center and Department of Economics, University of Michigan.

Eckland, B.K. (1968): Retrieving Mobile Cases in Longitudinal Surveys. Public Opinion Quarterly, 32, pp. 51–64.

Fogelman, K. (Ed.) (1983): Growing up in Great Britain: Papers from the National Child Development Study. MacMillan, London.

Goudy, W.J. (1976): Nonresponse Effects on Relationships Between Variables. Public Opinion Quarterly, 40, pp. 360–369.

Jowell, R. and Airey, C. (Eds.) (1984): British Social Attitudes: The 1984 Report. Gower, London.

Jowell, R. and Witherspoon, S. (Eds.) (1985): British Social Attitudes: The 1985 Report. Gower, London.

Jowell, R. H, Witherspoon, S., and Brook, L. (Eds.) (1986): British Social Attitudes: The 1986 Report. Gower, London.

Jowell, R. (1986): The Codification of Statistical Ethics. Journal of Official Statistics, Vol. 2, No. 3, pp. 217–254.

Kalton, G. (1986): Handling Wave Nonresponse in Panel Surveys. Journal of Official Statistics, Vol. 2, No. 3, pp. 303–314.

Kish, L. (1965): Survey Sampling. Wiley, p. 399.

Lazarsfeld, P. (1941): Repeated Interviews as a Tool for Studying Changes in Opinion and Their Causes. American Statistical Association Bulletin, Vol. 2.

Lievesley, D. and Waterton, J. (1985): Measuring Individual Attitude Change in British Social Attitudes. The 1985 Report. Gower, London.

McCullagh, P. and Nelder, J.A. (1983): Generalised Linear Models. Chapman and Hall, London.

OPCS (1986): Annual Report of the Social Survey Division 1984/1985. HMSO.

Parnes, H. (1972): Longitudinal Surveys: Prospects and Problems. Monthly Labour Review, 95, pp. 11–15.

Plewis, I. (1985): Exploring Change. Gower, London.

Powers, E. and Bultena, G. (1972): Characteristics of Deceased Drop-outs in Longitudinal Research. Journal of Gerentology, 27, pp. 530–535.

Singer, E., Garfinkel, R., Cohen, S.M., and Srole, L. (1976): Mortality and Mental Health: Evidence from the Midtown Manhattan Restudy. Social Sciences and Medicine, 10, pp. 517–525.

Sobol, M.G. (1959): Panel Mortality and Panel Bias. Journal of the American Statistical Association, 54, pp. 52–68.

Streib, G. (1966): Participants and Drop-outs in a Longitudinal Study. Journal of Gerentology, 21, pp. 200–209.

Survey Research Center (1984): User Guide to the Panel Study of Income Dynamics.

Ann Arbor, Michigan: Inter-university Consortium for Political and Social Research.

Traugott, M.W. and Katosh, J.P. (1979): Response Validity in Surveys of Voting Behaviour. Public Opinion Quarterly, 43, pp. 359–377.

U.S. Department of Labor (1974): Career Thresholds. A Longitudinal Study of the Educational and Labur Market Experience of Male Youth, Vol. 4, Washington D.C., Superintendent of Documents.

Waterton, J. and Lievesley, D. (1987): Evidence of Conditioning Effects in the British Social Attitudes Panel. Forthcoming (Presented at the Panel Conference of the American Statistical Association, Washington, November 1986).

Received August 1986
Revised August 1987