Accounting for Biases in Election Surveys: The Case of the 1998 Quebec Election

Claire Durand[1], Andre Blais[2], and Sebastien Vachon[1]

During the last electoral campaign in Quebec, Canada, all the polls published in the media had a similar estimate of vote intentions, putting the Parti Quebecois (PQ), a centre-left party dedicated to Quebec sovereignty, clearly ahead, by an average of five points in the last six polls of the campaign. The PQ won the election, held on November 30, 1998, but with a smaller share of the vote (43 per cent) than the contending Liberal party (44 per cent), a centre-right federalist party. Pollsters and many observers have maintained that the discrepancy between the polls and the actual vote could be explained either by a last minute shift in favour of the Quebec Liberal party or by differential turnout.

We rely on a number of data sources to sort out the possible causes of such a discrepancy. A post-election poll was conducted among fifteen hundred respondents of pre-election polls conducted by two pollsters, CROP and CREATEC. Three surveys carried out by CROP during the four-week campaign were analyzed in order to estimate the impact of item and unit nonresponse and of adjustment using Census data. A study of voting sections with a high percentage of institutions allows us to estimate the voting behaviour of residents of such institutions. Two STATMEDIA studies conducted in 1997 and 1998 provide information on the sociodemographic characteristics of respondents from unlisted and doubly listed telephone lines. Finally, three CROP surveys carried out after the election allow us to compare the voting intentions of respondents from listed and unlisted telephone numbers.

The results of the post-election survey do not support the late shift and differential turnout hypotheses. The most likely explanations for the discrepancy between vote intentions and the actual vote are to be found in survey nonresponse, in sampling frame biases and in the adjustment scheme. Analysis of nonresponse shows that there is a consistent tendency for those who refuse to answer surveys to be supporters of the Liberal party. An analysis of sampling frames shows that Liberal supporters are undersampled because of the absence of respondents living in institutions and of households with unlisted telephone numbers. Finally, the fact that survey firms adjust on the basis of age may contribute slightly to the underestimation of Liberal support.

[1] University of Montreal, Department of Sociology, C.P. 6128, succ. Centre-ville, Montreal, Canada, H3C 3J7. E-mail: Claire.Durand@umontreal.ca
[2] University of Montreal, Department of Political Science. E-mail: Andre.Blaise@umontreal.ca

1. Introduction

The general purpose of this article is to trace the possible effect of nonresponse on the estimation of vote intentions. The case of the election held in November 1998 in Quebec, Canada, is examined.

During the 30-day electoral campaign, the media published 17 polls. Only three of these put the Quebec Liberal party, a center-right federalist party, ahead of the Parti Québécois, a center-left party dedicated to Quebec sovereignty. The last six polls of the campaign gave, on average, a 5-point lead to the Parti Québécois over the Liberal party. On Election Day, it turned out, however, that the Parti Québécois had been outvoted by the Liberal party (44 per cent of the vote versus 43 per cent).

The first reaction of most pollsters and academics was to attribute this situation to the electorate (late campaign shift, differential turnover). Other academics argued that the gap between the polls and the actual outcome of the election could be due to nonresponse and/or to sampling frame biases. The article assesses the plausibility of these various explanations.

2. Context of the Study

Three areas of research have developed to explain discrepancies between poll measures of vote intentions by the polls and the outcome of the election. The first area of research is related to the electorate: either it changed its mind between the time when the survey was conducted or the vote or turnout is not proportionally distributed among party supporters. This area of research has driven pollsters to conduct surveys till the end of electoral campaigns, in order to explore the possibility of late campaign shifts.

Hypotheses attributing discrepancies to late campaign changes in the electorate have been examined by a number of authors. The 1992 election in Great Britain is one ''modern'' case that has drawn attention. Jowell et al. (1993) have shown that moves in the electorate and differential turnout, together with item nonresponse, could at best explain half of the nine-point discrepancy between the polls and the vote. A number of authors have examined similar situations where a discrepancy appeared between polls' estimates of vote intentions and the outcome of the election (Howell and Simms 1994; Curtice 1997; Bishoping and Schuman 1994; Traugott and Price 1992). The discrepancy seems to always head in the same direction, at least in the recent history of pre-electoral surveys, that of an under-representation of the more conservative vote in the polls. Validation of substantial late moves that could explain discrepancies has yet to be found though shifts between parties do indeed occur (Jowell et al. 1993). When an examination of all the available surveys of a campaign shows no move from one week to the other, whether using traditional mean difference or time series analysis, and when no significant event occurs in the last days of the campaign, a late campaign shift is very unlikely (Erikson and Wlezien 1999).

Differential turnout is another hypothesis that has been proposed to explain discrepancies. The reported intention to participate in the vote and the reported participation of survey respondents are generally higher than the actual turnout. Some have argued that there is a tendency to overreport having voted since voting is socially desirable. Others have

indicated that survey respondents do in fact participate more in the vote for a number of reasons: either they are more socially integrated, or participation in a survey stimulates voting behaviour (Granberg and Holmberg 1992; Traugott and Katosh 1979, 1981; Blais and Young 1999). Though the existence of misreport has been documented in some situations (Traugott and Katosh 1979, 1981), it is not clear if over-reporting is proportionally distributed among party supporters (Marsh 1985; Jowell 1993; Curtice and Sparrow 1997) or not (Traugott and Katosh 1979, 1981; Presser and Traugott 1992).

Another area of research is nonresponse. It is usually divided into two areas, item nonresponse and unit nonresponse. With respect to item nonresponse, it has been hypothesized that those who refuse to answer vote intention questions and/or those who indicate that they do not know whom they will vote for are more likely to be conservative. The hypothesis has been confirmed at least in the U.K. (Jowell et al. 1993; Curtice 1997; Curtice and Sparrow 1997). These last authors indicate that the more unpopular the Conservative Party, the stronger the propensity of conservative respondents to refuse to indicate their vote intention.

Unit nonresponse may also influence estimates of vote outcome. It is customary to estimate the effect of survey nonresponse, due to not-at-home and refusals, with data about hard to reach respondents and those living in households where a previous refusal had been recorded. Studies have consistently found that hard to reach respondents have specific characteristics in terms of demography (Triplett 1998) and political attitudes, i.e., that conservative voters are harder to reach (Traugott 1987; Lau 1994; Curtice and Sparrow 1997; Curtice 1997; Bolstein 1991). Furthermore, respondents who come from households where a refusal has been recorded also have specific characteristics, i.e., they are more likely to be women (Triplett 1998) and conservative (Curtice and Sparrow 1997). Thus, the more substantial the unit nonresponse is, the more substantial the likely bias against the conservative vote. Since surveys that use quotas usually have lower response rates, they are more likely to under-represent the conservative vote (Curtice and Sparrow 1997). Lau (1994) and Vachon, Durand, and Blais (1999) found a relationship between efforts made in order to increase the representativeness of the sample — and thus the response rate — and the quality of prediction of voting intentions.

Estimates of the effect of unit nonresponse based solely on hard to reach respondents and on aggregate survey data are not sufficient. It is important to also examine nonrespondents as such, i.e., those who were never reached or did not accept to cooperate. Previous research indicates that they are more likely to be nonvoters (Bolstein 1991; Marsh 1985; Granberg and Holmberg 1992) or to cast a more conservative vote (Bolstein 1991).

The third area of research is related to sampling frames. In theory, sampling frames should make it possible to represent the whole population of *electors*. A number of issues have been raised in this area, related to data collection modes. In North America, telephone polls have spread, becoming the standard way to conduct surveys of the general population, due to the good coverage of all households by telephone and the low density of population. If we concentrate on surveys conducted by telephone, one of the first coverage problems is related to unlisted telephone numbers. Households with unlisted telephone numbers have specific characteristics: their members seem less likely to vote (Bolstein 1991) and, in the U.K., more likely to be supporters of the Labour Party (Curtice 1997). Random digit dialling frames solve this problem, but since households with unlisted telephone numbers

are considered less cooperative (Drew, Choudhry, and Hunter 1988; Traugott, Groves, and Lepkowski 1987), pollsters have a tendency to rely on list-based frames.

New problems have appeared in recent years with the proliferation of households with multiple telephone lines and telephone numbers. These households could be over-represented in the sampling frames, particularly those using RDD frames. Triplett (1998) notes a phenomenon that could compensate for this higher probability of selection, namely the fact that these households seem harder to reach. However, Gelman and Little (1998) show that weighting for number of telephone lines does not have a substantial effect on estimation.

On the contrary, households with a larger number of adults could be underrepresented in sampling frames because of the two-stage samples used. The sampling frames comprise households from which a single individual is chosen, whatever the number of persons living in the households. Thus, the probability of selection decreases as household size increases. However, weighting by the number of adults in households may seriously over-represent larger households (Gelman and Little 1998), particularly when fieldwork lasts only two to four days and response rates are low, because these situations normally lead to an overrepresentation of easy to reach households. Adjusting for household size may have an effect on estimates of vote intention if household size is related to voting behaviour.

Another sampling frame related problem lies in the fact that the population residing in *collective households* — institutions, residences for students, old age pensioners, disabled people, members of religious communities — is absent from the sampling frames (Converse and Traugott 1986).

Finally, weighting is rarely mentioned in the literature as a possible culprit for discrepancies. Traugott (1987) reports that weighting procedures vary widely among pollsters. Jowell et al. (1993) point out that weighting will bias estimates of the vote only if weight variables are correlated with the vote. Gelman and Little (1998) suggest that adjusting weights in order to reflect the number of adults in households could improve the quality of estimates.

In summary, one hypothesis relates to the electorate: either a late campaign shift or differential turnout is responsible for discrepancies between the polls and the outcomes of the vote. Three hypotheses focus on nonresponse: those who do not indicate their vote intention, those who are hard to reach and those who refuse to answer surveys all tend to be more conservative. Four hypotheses concern the sampling frame: those with unlisted telephone numbers, those with doubly listed telephone numbers, those living in larger households and those living in institutions are more likely to vote for the Liberal Party. There is finally the possibility that the problem lies with adjustment or weighting.

Of these nine hypotheses, eight will be tested in this article. The possibility that those with doubly listed telephone numbers are overrepresented and less likely to vote for the Liberal party will not be tested because of the lack of data: In 1997, close to eleven per cent of the 3,008 respondents to a survey on media consumption carried out in Quebec (Stamedia 1997) could be reached at more than one telephone number. They were 15 per cent among the more educated, 19 per cent among people 15 to 24 years old as opposed to four per cent among 65 years old and over, 20 per cent among those who live in households where three or more members are 15 years old and over, and 20 per cent among those whose principal occupation is studying. Close to one of four households with a

high income (more than 50,000 US dollars) could be contacted at more than one telephone number. These characteristics are related to vote intention, but since the study did not include vote intention questions, it is impossible to determine whether the number of telephone lines is directly related to vote intention.

3. Data

This article relies on multiple sources of data to test hypotheses about the reasons for the systematic discrepancy between the polls and the vote found in the Quebec 1998 general election. The most often invoked reason for the discrepancy was that a substantial number of voters changed their minds during the last days of the campaign. In order to test that hypothesis we conducted a post-election survey among pre-election respondents and determined whether they had in fact voted - and if so, for whom. The cooperation of two pollsters, CREATEC and CROP, allowed us to conduct a survey of 1,500 French-speaking pre-election respondents, using a nonproportional stratified sample in order to overrepresent nondisclosers and supporters of third parties. The main results of this survey have been presented elsewhere (Durand and Blais 1999; Durand, Blais, and Vachon 2001) and will be briefly summarized here.

A second source of information comes from one pollster, CROP, which provided us with all the data for the three surveys it conducted during the electoral campaign, including the administrative basis of the surveys which contained detailed information (time of call, result of call, interviewer, etc.) about all attempts to reach a household and complete an interview. Since up to 25 attempts had been made to reach a telephone number and up to two attempts to convert initial refusals into completed interviews, it is possible to compare the vote intention of those who were harder to reach and/or who had previously refused to answer the survey with vote intentions in the rest of the sample.

A third source of information comes from the 14 polls originating from six different pollsters published during the campaign. These data allow us to perform time-series analyses of the evolution of vote intention during the campaign. Fourth, we rely on studies on the use and listing of telephone lines. Two studies were conducted by STATMEDIA in June 1997 and June 1998 and one was conducted by CROP in the months following the election.

Finally, we undertook an independent study to estimate the vote of *collective households* in a sample of constituencies. For each selected constituency, collective households and the voting sections in which they were located were identified. Information was gathered on these collective households (number of residents, proportion with a private telephone line, proportion of registered electors, estimated proportion of voters) and compared to the outcome of the election in the rest of the polling sections in the same constituencies.

4. The First Hypothesis: Looking for a Culprit or the Electorate Moved

The first ''easy'' explanation for the discrepancy between pollsters' estimation of the vote and the actual outcome is that the electorate moved: Polls have not been conducted late enough in the campaign and voters changed their minds or decided to stay home. This possibility has been addressed in another article (Durand, Blais, and Vachon 2001) and only a summary of the findings is presented here.

Table 1.   *Vote intention, reported vote and election results among French-speaking respondents*

	N	PQ (per cent)	Lib. (per cent)	ADQ (per cent)	Other (per cent)	Nondisclosers (per cent)	Will not vote–will cancel/Did not vote–cancelled (per cent)
Pre-election vote intention	1,483	52	30	16	1	(11) attributed	(7) withdrawn
Post-election reported vote	1,483	54	31	13	1	(8) attributed	(12) withdrawn
Election (estimation of French-speaking voters)		50	35	14	1		(22)

Note: Attributed means distributed to the parties according to the proposed allocation i.e., 60 per cent to the Liberal Party, 30 per cent to the Parti Québécois and 10 per cent to the ADQ. *Withdrawing* is equivalent to proportional allocation.

The late campaign shift hypothesis has been tested by means of a postelection poll conducted during the week following the election among French-speaking respondents of pre-election polls. This study was carried out only among French-speakers, for three reasons. First, it was hypothesized that the late campaign shift had occurred mainly among French-speakers, who constitute 83 per cent of the Quebec population. Second, even a huge shift among non-French-speakers would hardly explain more than one percentage point in the discrepancy between the polls and the vote. Finally, since one of the pollsters who collaborated in this study, CREATEC, had interviewed only French-speakers, it would have been necessary to rely only on CROP's respondents to estimate the voting behaviour of non-French-speaking voters and the sample would have been too small (N=140).

The results of the post-election poll are summarized in Table 1. This poll has not shown any late campaign shift in favour of the Quebec Liberal Party. Support for the Quebec Liberal Party is slightly larger in the post-election poll (31 per cent) than in the pre-election poll (30 per cent) but it is still three points lower than the actual vote. However, support for the Parti Québécois also appears larger in the post-election poll (54 per cent) than in the pre-election poll (52 per cent).

In fact, there was movement between all political parties during the last week of the campaign: Thirteen per cent of those who declared both their vote intention and their actual vote changed their minds between the time of the pre-election survey and Election Day. These figures may be compared with figures of five per cent, seven per cent, and ten per cent for three surveys presented by Jowell et al. (1993). In the present case, the net effect of this movement was slightly in favour of the Parti Québécois.

The post-election poll also shows that the proportion of reported turnout was 95 per cent among respondents who intended to vote for the Parti Québécois, compared to 91 per cent among Liberal Party supporters and 86 per cent among ADQ supporters (Durand, Blais, and Vachon 2001).

These two pieces of information lead to the same conclusion and confirm previous
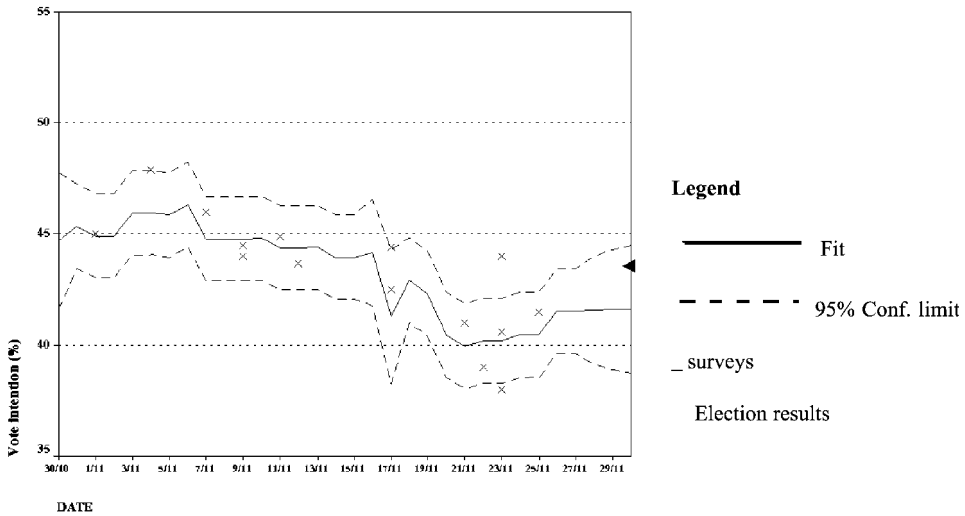
Fig. 1.   *Evolution of vote intentions for the Quebec Liberal Party as measured by the campaign surveys (October 30 - November 30)*

Note 1:   The series are constructed using the daily average of the weighed estimates of vote intentions, evenly distributed over the days where the surveys were conducted. Marks indicate the mid-point of the field period of each survey.

Note 2:   The actual vote (Election results) for the Quebec Liberal party was 43.5 per cent. The forecast from the series is 42 per cent.

research (Jowell et al. 1993; Curtice 1997; Erikson and Wlezien 1999): no late campaign shift occurred and no differential turnout could explain the discrepancy between the polls and the vote. As a consequence, the overestimation of the Parti Québécois vote is even more substantial in the post-election than in the pre-election polls.

Another piece of information is provided by the polls published during the campaign. Appendix A presents a list of the polls and information about the pollsters, sponsors, publication dates and survey period. All the polls were conducted by telephone. A time series analysis of the evolution of vote intentions was performed, using a method similar to the one used in Lau 1994 (also used in Vachon, Durand, and Blais 1999). A number of analyses were performed in order to achieve a good representation of the results from the various surveys and give an accurate forecast of the actual vote. The analysis that performs best is one of stable vote intention throughout the four-week campaign, except for a small decrease in support for the Liberals and a similar increase in support for the ADQ (Action Démocratique du Quebec, a recently formed right-wing party that finally got twelve per cent of the vote) after the televised debate held at mid-campaign. A statistical analysis using ARIMA shows that the model that best fits the data is a model of autocorrelation with no effect of time and a significant but small effect of the televised debate on vote intentions for the ADQ and the Liberal Party. This analysis leads to a forecast of 42 per cent of the vote for the Quebec Liberal Party (Figure 1) and 46 per cent for the Parti Québécois (Figure 2), beyond the margin of error in the latter case.

Although this analysis is based on a small number of data points, it nonetheless gives an indication, similar to the post-election survey, that there was no late shift towards the Liberals and that the polls were systematically overestimating the support for the Parti Québécois.
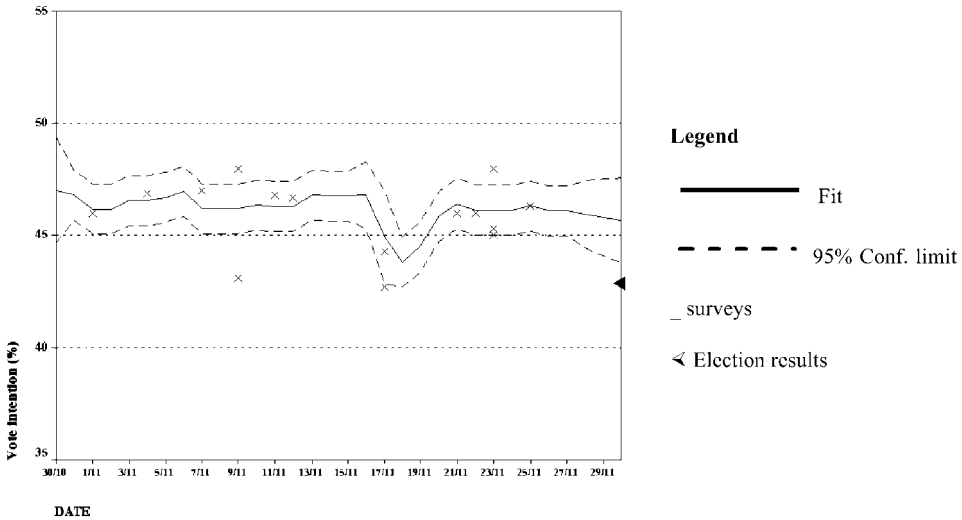
Fig. 2.   Evolution of vote intentions for the Parti Québécois as measured by the campaign surveys (October 30 - November 30)

Note 1:   The series are constructed using the daily average of the weighed estimates of vote intentions, evenly distributed over the days where the surveys were conducted. Marks indicate the mid-point of the field period of each survey.
Note 2:   The actual vote (Election results) for the Parti Québécois was 42.9 per cent. The forecast from the series is 46 per cent.

5.   The Second Hypothesis: Nondisclosers Overwhelmingly Voted for the Liberals

The hypothesis here is that nondisclosers, i.e., those who answer surveys but say that they do not know who they will vote for or who refuse to provide the information, vote differently from disclosers. Since nondisclosers are believed to be more inclined to vote for the Liberal Party, Quebec pollsters (identified in Appendix A) allocated 60 per cent of nondisclosers to the Liberal Party, 30 per cent to the Parti Québécois and 10 per cent to the ADQ, following a recommendation by sociologist Pierre Drouilly based on a comparison of previous election outcomes and campaign poll results. How did the nondisclosers actually vote?

A first source of information is the post-election survey among French-speaking respondents to pre-election polls. The results, presented in Table 2, show that among respondents who had indicated their vote intention in the pre-election polls, the disclosers, twice as many reported having voted for the PQ (50 per cent) than for the Liberal Party (24 per cent). On the other hand, among those who did not know or who had refused to tell how they would vote, the nondisclosers, an equal proportion voted for the two main parties (between 21 and 27 per cent). Only if we attribute all the refusals in the post-election poll to the Liberal Party do we get near the pollsters' allocation (60 per cent Lib., 30 per cent PQ, 10 per cent ADQ). Support for the Liberal Party among French-speaking nondisclosers was proportionally larger than among disclosers but it was smaller than what pollsters had assumed. Clearly, underestimation of support for the Liberal Party among nondisclosers does not appear to be responsible for the underestimation of the Liberal vote.

Another source of information is the three polls conducted by CROP during the

Table 2. Reported vote of French-speaking respondents according to disclosure of pre-election vote intention

Disclosure in the pre-election poll ↓	Reported vote in the post-election poll (weighted). Per cent.				
	PQ	Lib.	ADQ + other	Refusals	Did not vote
Total disclosers (N = 1,080/*weighted N*:1,215)	50	24	13	4	8
Total nondisclosers (N = 296/*weighted N*:163)	25	23	10	31	9
Undecided (N = 108/*wN*:63)	22	27	13	21	17
Refusals (N = 188/*wN*:100)	26	21	12	37	4
Will cancel/will not vote (N = 105/*weighted N*:104)	9	7	7	13	65

Note: The proportions are based on weighted figures. Weights have been applied in the following manner. First, the adjustment based on the 1996 Census used by the two pollsters was applied. Second, since the sample had been stratified in order to represent nondisclosers, the original weights were multiplied by the reciprocals of the probabilities of selection and of the response rates of each stratum defined by pre-election voting intentions in each sample. See Durand, Blais, and Vachon (2001) for more details.

campaign (see Appendix A). Like other pollsters, CROP asked a *leaning question* to the nondisclosers, i.e., those who did not reveal their preference in the initial vote intention question. The proportion of such nondisclosers was stable throughout the campaign, the proportion of ''don't know'' in the three polls varying from nine to twelve per cent, the proportion of refusals from two to four per cent and the proportion of those who said that they would not vote or that they would cancel their vote from two to three per cent. Nondisclosure is thus not a simple reflection of indecision; if it were, it would decline as the campaign progressed.

The pollster asked all nondisclosers as well as those who indicated that they would not vote or that they would cancel their vote (often referred to as ''spoiling the ballot,'' i.e., marking the ballot in such a way as to make it invalid) which party they were *leaning* toward. About one quarter of those who were asked the leaning question indicated a preference for a party, giving an estimate of nondisclosers' preferences. We hypothesize that there is a continuum from spontaneous disclosure to reluctant disclosure — indicating a preference only at the second ''leaning'' question — and to nondisclosure — never indicating a preference — and that Liberal supporters tend to be at the nondisclosure end of the continuum.

Table 3 shows that, among the nondisclosers, close to 47 per cent maintained in the leaning question that they did not know who they would vote for, 17 per cent refused to reveal their intentions and ten per cent said that they would not vote or that they would cancel their votes. The 26 per cent who revealed their preferences, the reluctant disclosers, were equally distributed between the Liberal Party (40 per cent) and the Parti Québécois (42 per cent), being less favourable to the Parti Québécois than those who revealed their vote intentions in response to the initial question.

In view of this information, it is possible to conclude that the second hypothesis related

Table 3.   Response to the initial vote intention question and to the leaning question -CROP pre election surveys

	Declared vote intention (weighted). Per cent.					
	PQ	Lib.	ADQ + other	Undecided	Refusals	Did not vote
Vote intention (initial question)–all respondents–$N = 3,015$	41.8	33.8	8.8	10.5	2.8	2.4
Vote intention (initial question)–disclosers only–$N = 2,543$	*49.5*	*40.1*	*10.4*	–	–	–
Vote intention (leaning question)– all non- disclosers– $N = 472$	11.0	10.4	4.9	46.8	16.5	10.4
Vote intention (leaning question)– reluctant disclosers– $N = 124$	*41.9*	*39.7*	*4.9*	–	–	–

Note 1: The three Crop surveys are presented in Appendix A. They were conducted on Oct. 30-Nov. 4, Nov. 6-11 and Nov. 19-23.

Note 2: The weights used here are those originally used by the firm, in fact Census-based adjustment according to cells defined by sex (2), age groups (6), language spoken at home (3) and region (4). These weights are meant to reflect the proportion of the population in each of these cells. The weights have been post-multiplied in order to bring the totals back to the exact sample.

Note 3: The leaning question is asked to nondisclosers and to those who say that they will not vote or that they will cancel their votes.

to the vote of nondisclosers is not supported. Previous research (Jowell et al. 1993; Curtice 1997; Curtice and Sparrow 1997) is confirmed in the sense that nondisclosers are slightly more inclined to vote for a more conservative party, in this case the Liberal Party. However, this is fully taken into account by Quebec pollsters, who attribute 60 per cent of the vote of nondisclosers to the Liberal Party. Attribution of vote to nondisclosers is therefore not a likely source of the discrepancy between the polls and the outcome of the vote.

6.   The Third Hypothesis: Those Who Could not be Reached Were More Likely to Vote Liberal

Some pollsters and academics, in concordance with consistent findings of survey research (Traugott 1987; Lau 1994; Curtice and Sparrow 1997; Curtice 1997; Bolstein 1991), have proposed the hypothesis that individuals who are not reached by the pollsters are more likely to support the Quebec Liberal Party. If that were the case, respondents who were harder to contact would also be more likely to vote Liberal. A polynomial logistic regression was performed using vote intention as the dependent variable and number of calls necessary to reach a household as well as to complete an interview as the independent variables. No significant linear (or nonlinear) relationship was found ($\chi^2 = 5.0\ df = 5, p = .41$; $\chi^2 = 6.8, df = 5, p = .23$).

This result is surprising in view of previous research and given the fact that there is a relationship between the number of calls and socio-demographic characteristics that are

Table 4. Mean number of calls necessary to reach a household or complete an interview according to vote intention and socio-demographic characteristics

		N	Mean number of calls necessary to	
			reach	complete
Vote intention	PQ	1,311	2.3	3.2
(Initial + leaning	Lib.	1,069	2.2	3.2
question)	ADQ + other parties	286	2.2	3.4
	Undecided	220	2.3	3.2
	Refuse to say	78	2.5	3.8
	Will cancel, not vote	49	2.6	3.3
Age groups	18-24 years	335	2.2	3.4+
	25-34 years	636	2.5+	3.5+
	35-44 years	694	2.4+	3.4+
	45-54 years	538	2.2	3.1+
	55-64 years	338	2.2	3.1+
	65 years +	473	2.0–	2.6–
Years of	7 years or less	266	2.1	2.8
school completed	8-9 years	291	1.9–	2.7–
	10-11 years	552	2.1	3.1+
	12-15 years	1,147	2.4+	3.4++
	16 years and more	742	2.5++	3.4++
Main activity	works full time	1,496	2.4+	3.4+
	works part time	298	2.0	3.0
	unemployed	132	2.4	3.1
	housekeeper	260	2.3	3.2
	retired	614	2.0–	2.7–
	student	210	2.3	3.5+
Language	French	2,479	2.3	3.1–
spoken at home	English	394	2.5+	3.6+
	Other language	142	2.1–	3.6+
Region	Montreal Metro	841	2.2+	3.5+
	Montreal suburbs	580	2.9++	4.1++
	Quebec Metro	290	2.0–	2.6–
	Rest of Quebec	1,303	2.1	2.7–
Total		3,014	2.3	3.2

Note: Plus signs are significantly different from minus signs ($p < .05$)

linked to vote intention. Table 4 presents the mean number of calls necessary to reach a household and to complete an interview according to a number of sociodemographic characteristics in addition to vote intention. The number of calls necessary to reach a telephone number is significantly larger among the 25 to 44 years old, the more educated, full-time workers, English-speakers and residents of the Montreal region. The number of calls necessary to complete an interview is also larger among respondents less than 65 years old, the better educated, full-time workers and students, non-French-speakers and residents of the Montreal region.

Table 5. Initial refusal to answer the survey, pre-election vote intention and post- election reported vote

	No refusal		Converted refusal		Point difference
	Count	Per cent	Count	Per cent	Per cent
CROP pre-election surveys					
PQ	1,180	44.1	132	38.7	-5.4
Lib.	941	35.2	128	37.5	+2.3
ADQ + other parties	258	9.6	29	8.5	-1.1
Undecided	193	7.2	28	8.2	+1.0
Refusal	58	2.2	20	5.9	+3.7
Will cancel, not vote	45	1.7	4	1.2	-0.5
Total	2,675	100.0	341	100.0	
CROP post-election survey (French-speaking respondents)					
PQ	159	39.3	8	21.6	-17.7
Lib.	100	24.7	10	27.0	+2.3
ADQ + other parties	61	15.0	4	10.8	- 4.2
Refusal	28	6.9	10	27.0	+20.1
Did not vote, cancelled	58	14.3	5	13.5	+0.8
Total	406	100.0	37	100.0	

Note: The weights used here are the ones originally used by the firm, in fact Census-based adjustments according to cells defined by sex (2), age groups (6), language spoken at home (3) and region (4). These weights are meant to reflect the proportion of the population in each of these cells. The weights have been post-multiplied in order to bring the totals back to the number of respondents in the sample.

It is possible that the diverse characteristics of hard to reach individuals cancel each other, with no net effect on the overall distribution of vote intentions. There is thus no indication that nonresponse attributable to hard to reach individuals can explain the discrepancy.

7. The Fourth Hypothesis: Those Who Refused to Answer Surveys Were More Likely to Vote Liberal

Another possibility is that those who refuse to answer surveys are more likely to be supporters of the Liberal Party. It is of course impossible to determine the voting behaviour of people who do not answer surveys but it is possible to find out whether there is a relationship between the propensity to refuse to answer surveys and the propensity to vote Liberal. More specifically, we can determine whether those who initially refuse to answer a survey but accept on a second or third attempt are more likely to support the Liberals.

This hypothesis can be tested with two data sets. First, the three campaign surveys conducted by CROP are used. Close to twelve per cent of the respondents in these surveys had refused to give an interview or belonged to a household where an interview had been refused. As can be seen in Table 5, respondents from households where a refusal had taken place were more likely to be Liberals. The PQ had a 9-point lead in vote intentions in households with no refusal, while it had only a one-point edge among converted refusals. There are two percentage points more Liberals and five percentage points fewer supporters of the Parti Québécois among converted refusals than among households where no refusals have taken place.

The same pattern emerges out of the CROP part of the post-election survey among

French-speaking respondents. In that survey, nine per cent of the respondents were from households where temporary refusals had occurred in the pre-election survey. The PQ had a 15-point lead in reported vote in households with no refusal while the lead is five points for the Liberals among converted refusals. As a consequence, there are two percentage points more Liberals and 18 percentage points fewer supporters of the Parti Québécois among converted refusals than among the other respondents.

The fourth hypothesis, according to which surveys under-represented Liberal support because Liberal supporters are more likely to refuse to answer surveys, is thus supported. These results confirm previous research by Curtice and Sparrow (1997), which showed that those who refuse to answer surveys tend to be more conservative.

8. The Fifth Hypothesis: Those with Unlisted Telephone Numbers Were More Likely to Vote Liberal

Sampling frames used by most Quebec pollsters during the electoral campaign did not include unlisted telephone numbers. Was this a source of bias in the estimate of vote intentions? Two sources of information are used in order to examine this possibility.

CROP provided us with the results of surveys it conducted in February, April, and August 1999. In these surveys, unlisted telephone numbers were not excluded from the samples in order to evaluate the possible effect of their exclusion. More precisely, the sample, generated using Random Digit Dialing (RDD), was originally divided into two parts, directory listed (DL) and nondirectory listed (NDL). The NDL part is composed of telephone numbers that were not found in the transcribed telephone directories. CROP also asked respondents whether their telephone number was in fact listed in the directory as well as their vote intention.

A majority of respondents coming from the NDL part of the original samples indicated that their telephone number was in fact listed. This situation may be attributed to the delay between the publication of the directory (29 regional directories published throughout the year) and its integration in the database used to verify telephone numbers. From 16 to 22 percent of respondents came from the NDL part of the RDD generated sample while eight percent of all respondents indicated that their telephone number was not listed and three percent indicated that they did not know. Table 6 shows that, in two of the three polls, respondents whose telephone number came from the nondirectory listed part of the sample appeared more likely to intend to vote for the Liberal Party and less likely to favour the Parti Québécois. Furthermore, respondents who indicated that their telephone number was not listed were found in all three surveys to be less likely to favour the Parti Québécois.

The second source of information is a Statmedia study conducted in June 1998 among 3,000 respondents. The proportion of respondents who indicated that their telephone number was not listed or who were not sure was twelve percent in Quebec and 17 percent in the Montreal region. This information is confirmed by four CROP surveys conducted during the months following the election (February to May 1999). Both sources conclude that unlisted telephone numbers are more likely to belong to non-French-speaking Quebeckers and to younger people (less than 25 years old). This could explain the lower proportion of non-French-speaking and young people in the samples compared to the Census (see

Table 6.   Vote intention according to listing in the directories: CROP surveys, February, April, and August 1999

	Directory			Reported		
	Listed (Per cent)	Not Listed (Per cent)	Point difference (Per cent)	Listed (Per cent)	Not Listed (Per cent)	Point difference (Per cent)
February 1999						
PQ	38	38	0	39	33	-6
Lib.	30	23	-7	29	29	0
ADQ + other parties, cancel	13	22	+9	15	16	+1
Will not vote, undecided, refusal	19	17	-2	17	22	+5
Total *N*	836	167		894	82	
April 1999						
PQ	36	32	-4	36	25	-11
Lib.	33	36	+3	33	38	+5
ADQ + other parties, cancel	13	15	+2	12	12	0
Will not vote, undecided, refusal	18	17	-1	18	24	+6
Total *N*	806	199		895	81	
August 1999						
PQ	34	30	-4	34	29	-5
Lib.	33	34	+1	34	35	+1
ADQ + other parties, cancel	13	15	+2	12	13	+1
Will not vote, undecided, refusal	20	22	+2	20	23	+3
Total *N*	781	220		882	91	

Column 2, Table 7, compared to Column 1). Non-French-speaking Quebeckers tend to vote overwhelmingly for the Liberal Party while young people are less likely to vote and more likely to vote for the Parti Québécois. However, non-French-speaking voters are more numerous and homogeneous in their vote choice than young people.

We can thus conclude that in the Quebec case, contrary to the U.K. (Curtice 1997), excluding unlisted telephone numbers may have contributed to the bias against a more conservative party, the Liberal Party.

9.   The Sixth Hypothesis: Respondents from Larger Households Were More Likely to Vote Liberal

In all these surveys, one and only respondent is randomly selected within households, whatever its size. As a consequence, the probability of being selected is larger in smaller households. Theoretically, this should be compensated by weighting respondents by the inverse of the probability of selection. Since none of the survey firms used such weighting, respondents from larger households are underrepresented in these surveys. Is this a source of bias in the estimation of the vote?

Table 7.   *Characteristics of the CROP samples, unweighted, adjusted and weighted. Per cent*

| | | Adjusted w. Census data for region, sex and language | | Weighted by inverse prob. of selection and resp. rates by region | | |
| | Raw data weighted only to compensate stratification | Age groups adjusted | | Weighted for within household selection | | |
		yes	no	yes	no	
Vote intention	PQ	45.2	43.5	43.1	44.7	45.1
	Lib.	33.1	35.5	35.9	33.7	33.3
	ADQ + other parties	9.5	9.6	9.4	9.8	9.5
	Undecided	7.8	7.3	7.8	7.7	7.8
	Refuse to say	2.7	2.6	2.7	2.6	2.7
	Will cancel. not vote	1.6	1.6	1.6	1.6	1.7
Age groups	18-24 years	9.2	11.1	9.8	12.6	9.3
	25-34 years	18	21.1	18.2	18.1	18.1
	35-44 years	26	23	25.3	24.9	25.9
	45-54 years	19.7	17.9	19.5	20.6	19.6
	55-64 years	11.4	11.2	11.3	10.6	11.4
	65 years +	15.7	15.7	15.8	13.3	15.8
Sex	Men	44.6	48.4	48.4	46	44.6
	Women	55.4	51.6	51.6	54	55.4
Language spoken at home	French	88.1	82.2	82.6	87	87.9
	English	9	13.1	12.9	9.1	9.2
	Other language	2.9	4.7	4.5	3.8	3
Number of people in household	1	32	30.4	31.1	16.4	31.3
	2	53.8	53.5	53.2	56.5	53.7
	3	9.5	10.9	10.6	16	10.2
	4 or more	4.7	5.2	5	11	4.9

There is a relationship between vote intention and the number of adults in households ($\chi^2(18)= 34.7$, $p=.01$). Those living in households with two adults seem more inclined to vote for the Parti Québécois and ADQ while those living in households of one adult or three or more adults tend to favour the Liberal Party. What is the effect of this relationship on estimation of vote intentions? One test is to compare vote intentions when weighting by the inverse probability of selection including weights for the number of adults within household with the same weighting procedure without weights taking into account the number of adults. Table 7 shows that the estimate of Liberal support is slightly larger when weights for the number of adults are used (Column 4) than when they are not used (Column 5). These results are very similar to what has been found by Gelman and Little (1998) for the 1988 U.S. presidential election. Therefore, the fact that pollsters do not take into account the number of adults within households may contribute to the bias against the Liberal Party.
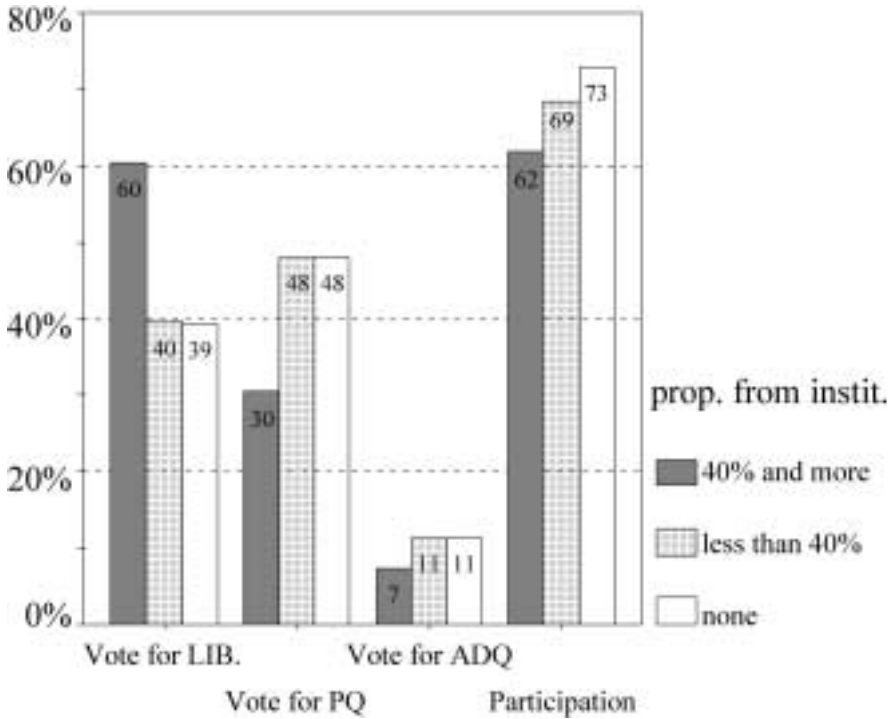
Fig. 3.   Voting behaviour of polling sections according to the proportion of voters from institutions

10.   The Seventh Hypothesis: Those Living in Institutions Were More Likely to Vote for the Liberals

Changes in the demographic composition of the population may have played a role in the estimation of vote intentions during the 1998 electoral campaign in Quebec. According to the Census, the Quebec population aged 65 years and older has risen from 13 per cent of the total population over 18 in 1986 to 17 per cent in 1996. About ten per cent of those over 65 live in institutions — the term used by the Canadian Census is *collective households* — e.g., residences for old age pensioners, physically disabled people, and members of religious communities. Their number increased by 25 per cent from 1986 to 1996. People aged 65 years and older constituted 71 per cent of the people living in institutions in 1996. These people are included in the sampling frames only if they have a private telephone line.

A specific study was carried out to test the hypothesis. A sample of ten per cent of the constituencies was drawn. In each of the sampled constituencies, the following information was gathered for each poll section: actual vote, number of registered electors, number of voters, presence of institutions, proportion of residents of institutions who were registered to vote and who voted, and proportion who had a private telephone number. Part of the information was available from the Directeur général des élections. The information on institutions was gathered from members of parliament. Additional detailed information was gathered directly from the institutions themselves. All but one MP out of twelve collaborated with the study (more information in Durand, Blais, and Vachon 2001). Our

estimate is that half of the people living in institutions have access to a private telephone number and can therefore be reached by survey companies; the proportion registered to vote is estimated at 70 per cent and the overall proportion of voters at about 43 per cent. A conservative evaluation for 1998, based on these figures and on the Canadian Census data, thus gives an estimate of 52,000 voters from institutions, 1.3 per cent of all voters.

People living in institutions differ in their voting behaviour from other electors in the same constituencies. Figure 3 shows that, in the polling sections where more than 40 per cent of registered electors live in institutions, the participation rate is eleven percentage points lower than in the other polling sections. In these same sections, the proportion that votes for the Liberal Party is 20 percentage points higher. This lead is similar to the Liberal lead among those aged 65 years and over in general. Even though pollsters may reach half of the voters living in institutions, adjustment weighting used by these firms does not take into account this segment of the voting population since it is based on Statistics Canada's Census of private households. We can thus conclude that the under-representation of those living in institutions has contributed to the discrepancy between the polls' estimates and the outcome of the vote.

11. The Eighth Hypothesis: Adjustment to Census Data Contributes to the Under-Estimation of Vote Intentions for the Liberal Party

Survey firms usually get lower response rates among men, among those under 35, and among minority groups (in Quebec, non-French-speaking). Men and younger respondents are slightly more likely to vote for the Parti Québécois but non-French-speaking respondents tend to vote overwhelmingly for the Liberal Party. These biases may tend to cancel each other. However, survey firms use adjustments to reflect the exact composition of the population living in private households and in order to compensate the higher or lower response rates of different groups as well as reflect prior stratification. The term *adjustment* refers to the procedure by which cells defined by a number of characteristics — in the present case, region, age group, language, and sex — are compared to the most recent census data and adjusted so as to reflect the exact composition of the population in each cell. Using this type of adjustment improves the estimation of vote intentions for the Liberal Party, as can be seen when comparing Column 2 of Table 7, which presents the adjusted figures, with Column 1, which presents the raw data, only weighted to take stratification by region into account.

The question, however, is whether a better procedure could be used. Adjustment is based on data, from the 1996 Census in the present case, which may be outdated. More importantly, Census data provide information about the whole population living in private households, not the population of voters. Given the lower propensity to vote of younger respondents, it is not clear that their proportion in the sample should be adjusted in order to reflect their proportion in the population. On the other hand, French-speaking respondents are also weighted down to 82 per cent, their proportion in the Quebec population according to the Census. However, many immigrants, mostly not French-speaking, are not Canadian citizens and therefore do not have the right to vote. As a consequence, the proportion of French-speaking citizens among voters is about 85 per cent (Johnston, Blais,

Gidengil, and Nevitte 1996, p. 195). Finally, we have just seen that voters from institutions, mainly 65 years old and over are also weighted down.

What would happen then if we used adjustments according to the Census based on region, language, and sex but not age? In this way, the fact that young people who are harder to reach are also less likely to vote can be taken into account. The results of such estimation are presented in the third column of Table 7. The table shows that not adjusting for age very slightly raises vote intentions for the Liberals (from 35.5 to 35.9 per cent), thus slightly reducing underestimation.

This raises the possibility that, because turnout varies so much among subgroups, the best procedure would be not to make any adjustment at all, to rely solely on weighting according to the inverse probability of selection within households and regions. The term *weighting* refers to the procedure by which stratification of the sample (in the present case by region) and probability of selection within household are compensated. It is usually referred to as *weighting by inverse probability of selection*. In this procedure, differential response rates by strata are also compensated. Would the vote estimates be any better? The simple answer is no. It can be seen that the estimate of Liberal support is lower (33.7 per cent, see Column 4) with weighting by inverse probability of selection than with adjustment to Census data (35.5 per cent, Column 2).

The analysis thus leads to two conclusions. First, it makes sense to adjust on the basis of Census data and it is not because of such adjustments that the Liberal vote is underestimated. Second, one specific aspect of the adjustment procedure is more problematic. Because the propensity to vote is lower among young electors, it may be unwise to adjust on the basis of the proportion of different age groups in the population. The fact that survey firms do adjust on the basis of age, while they should probably not, may contribute slightly to the underestimation of Liberal support.

12.   Conclusion

In this study, possible explanations for the discrepancy between estimates of vote intentions and the actual outcome of the 1998 Quebec Election in which a systematic bias in favour of the Parti Québécois had appeared in the polls have been examined. Table 8 synthesizes the results of the tests that have been conducted.

In summary, we have shown that the gap cannot be imputed to a late campaign shift in vote intentions (#1) or to an inadequate allocation of the vote of nondisclosers (#2). The

Table 8.   *Synthesis of the findings*

Hypothesis	Results
1. Looking for a culprit or the electorate moved	No
2. Nondisclosers overwhelmingly voted Liberal	No
3. Those who could not be reached were more likely to vote Liberal	No
4. Those who refused to answer surveys were more likely to vote Liberal	Yes
5. Those with unlisted telephone numbers were more likely to vote Liberal	Yes
6. Respondents from larger households were more likely to vote Liberal	?
7. Those living in institutions were more likely to vote for the Liberals	Yes
8. Adjustment to Census data contributes to the underestimation of vote	No
intensions for the Liberal Party	No

sources of the discrepancy appear to be in survey nonresponse, in sampling frames and in adjustment.

The first source of discrepancy is survey nonresponse. Those who tend to refuse to answer surveys appear more inclined to vote for the Liberals (#3). Their absence clearly contributes to the underestimation of the Liberal vote.

As for sampling frame issues, those with unlisted telephone numbers (#5) and those living in institutions (#7), including those with no private telephone line, appear to be more likely to support the Liberals. Survey firms' failure to weight respondents on the basis of household size (#6) may also have influenced the estimation of vote intentions. Finally, Parti Québécois support was very slightly inflated by adjustment on the basis of age (#8), an adjustment that may not be warranted given the low turnout among young electors.

There are many sources for the polls' underestimation of the Liberal vote. The effect of each bias is small but all biases are in the same direction, that of an underrepresentation of the Liberals.

Pollsters will have to devote greater effort to improving the quality of their sampling frame and adjustment/weighting procedures and to increasing their response rates in order to come up with more reliable measures of party support.

13. References

Bishoping, K. and Schuman, H. (1994). Pens and Polls in Nicaragua: An Analysis of the 1990 Preelection Surveys. American Journal of Political Science, 36, 331-350.

Blais, A. and Young, R. (1999). Why Do People Vote? An Experiment in Rationality. Public Choice, 99, 39-55.

Bolstein, R. (1991). Comparison of the Likelihood to Vote Among Preelection Poll Respondents and Nonrespondents. Public Opinion Quarterly, 55, 648-650.

Converse, Ph. E. and Traugott, M. W. (1986). Assessing the Accuracy of Polls and Surveys. Science, 234, 1094-1098.

Curtice, J. (1997). So How Well Did They Do? The Polls in the 1997 Election. Journal of the Market Research Society, 39, 449-461.

Curtice, J. and Sparrow, N. (1997). How Accurate Are Traditional Quota Opinion Polls? Journal of the Market Research Society, 39, 433-448.

Drew, J. D., Choudhry, G. H., and Hunter, L. A. (1988) Nonresponse Issues in Government Telephone Surveys. In Groves, R. M., Biemer, P. P., Lyberg, L. E., Massey, J.T., Nicholls, W. L., and Waksberg, J. Telephone Survey Methodology, New York: Wiley, 233-246.

Durand, C. and Blais, A. (1999). Why Did the Polls Go Wrong in the 1998 Quebec Election: The Answer from Post Election Polls. Bulletin de Méthodologie Sociologique (BMS), 62, 43-47.

Durand, C., Blais, A., and Vachon, S. (2001). A Late Campaign Swing or a Failure of the Polls? The Case of the 1998 Quebec Election. Public Opinion Quarterly, 65, 108-123.

Erikson, R. E. and Wlezien, C. (1999). Presidential Polls as Time Series: The Case of 1996. Public Opinion Quarterly, 63, 163-177.

Gelman, A. and Little, T.C. (1998). Improving on Probability Weighting for Household Size. Public Opinion Quarterly, 62, 398-404.

Granberg, D. and Holmberg, S. (1992). The Hawthorne Effect in Election Studies: The Impact of Survey Participation on Voting. British Journal of Political Science, 22, 240-247.

Howell, S.E. and Sims, R. T. (1994). Survey Research and Racially Charged Elections: The Case of David Duke in Louisiana. Political Behavior, 16, 219-236.

Johnston, R., Blais, A., Gidengil, E., and Nevitte, N. (1996). The Challenge of Direct Democracy: The 1992 Canadian Referendum. Montreal : McGill-Queen's University Press.

Jowell, R., Hedges, B., Lynn, P., Farrant, G., and Heath, A. (1993). The 1992 British Election: The Failure of the Polls. Public Opinion Quarterly, 57, 238-263.

Lau, R.R. (1994). An Analysis of the Accuracy of ''Trial Heat'' Polls During the 1992 Presidential Election. Public Opinion Quarterly, 58, 2-20.

Marsh, C. (1985). Prediction of Voting Behavior from a Pre-election Survey. Political Studies, 33, 642-648.

Presser, S. and Traugott, M. W. (1992). Little White Lies and Social Science Models: Correlated Response Errors in a Panel Study of Voting. Public Opinion Quarterly, 56, 77-86.

Traugott, M. W. (1987). The Importance of Persistence in Respondent Selection for Pre-Election Surveys. Public Opinion Quarterly, 51, 48-57.

Traugott, M. W., Groves, R. M., and Lepkowski, J. M. (1987). Using Dural Frame Designs to Reduce Nonresponse in Telephone Surveys. Public Opinion Quarterly, 51, 522-539.

Traugott, M. W. and Katosh, J. P. (1981). The Consequences of Validated and Self-Reported Voting Measures. Public Opinion Quarterly, 45, 519-535.

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

Traugott, M. W. and Price, V. (1992). Exit Polls in the 1989 Virginia Gubernatorial Race: Where Did They Go Wrong? Public Opinion Quarterly, 56, 245-253.

Triplett, T. (1998). What Is Gained from Additional Call Attempts and Refusal Conversion and What Are the Cost Implications? Survey Research Center, University of Maryland, October.

Vachon, S., Durand, C., and Blais, A. (1999). Les sondages moins rigoureux sont-ils moins fiables? Canadian Public Policy/Analyse de politiques, 25, 557-561 (In French).