Mode and scale effects: measuring confidence in institutions

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Betsy Blunsdon

Ken Reed

Faculty of Business and Law,
Deakin University

Contact details
Address: 221 Burwood Highway
Burwood, VIC 3125
Phone: 03 9244 6272
Email: betsy.blunsdon@deakin.edu.au

Introduction

The aim of this study is to test the effects of survey, response scale and the interaction of mode and scale on survey response. There are a variety of reasons why it is important to understand how survey mode and instrument design affect the accuracy of survey results, but these are particularly salient when the researcher wishes to compare data from different surveys on the same topic. For example, a series of national, random-sample surveys were undertaken in Australia between 1983 and 2003 to measure public confidence and trust in institutions. While many of the items used in these surveys were quite similar, they used different methods of administration and different response categories for the same items. They differed in mode (using face to face interviews, computer-assisted telephone interviewing (CATI) and self-completed paper questionnaires) and two different response scales were used. Three of the surveys (carried out in 1983, 1995 and 2003) used the following four response categories:

- A great deal of confidence
- Quite a lot of confidence
- Not very much confidence
- No confidence at all

While another three (carried out in 1984, 1995/6 and 2003) used these six response categories:

- A very great deal
- A great deal
- Some
- Only a little
- Hardly any
- None at all

The use of common items in these surveys offers the potential of gaining the advantages of larger sample sizes by pooling data from different surveys; and, of particular interest in this case, the possibility of assessing change over a twenty year period. However, the different data collection modes and response scales mean that

the surveys cannot be compared directly, as the effects of differences between the samples are confounded by differences between mode and response scale.

Theoretical Background

Mode of Survey Administration Effects

Mode effects are one potential source of measurement error, specifically an error of observation in which the recorded measures do not reflect the true values of the variable (Braverman et al 1996). Tarnai and Dillman (1992) have argued that "The question of whether survey respondents provide the same answers regardless of whether queried by mail, telephone, or face-to-face interviews has become a critical issue for the advancement of survey research." (1992, p. 128). This issue has only increased in importance because of the growth in mixed mode, particularly as researchers employ multi-mode survey designs to counter falling response rates or to use results from two or more modes to provide better information to model non-response. As Dillman, Sangster, Tarnai and Rockwood argue, "to the extent respondents answer questionnaires differently simply because of a different survey mode, the reliability of results is threatened…More generally, to the extent that the same survey item produces different distributions of answers across response categories, questions must be raised about the meanings of the answers." (1996:p. 46).

Mode effects have long been recognised as a source of difference in survey responses. Initially, methodological interest concentrated on the differences between face-to-face and telephone data collection modes in response to the increased use of telephone interviewing due to technological advancement and cost concerns (Colombotos 1969; Groves and Kahn 1979; deLeeuw and van der Zouwen 1988; de Leeuw 1992). Later, there was a shift and focus has been on mail/postal data collection compared to either interview method, face-to-face or telephone (Dillman and Brown et al 1995; Dillman, Sangster et al 1996). Dillman et al argue that "…the likelihood of differences existing between mail and either of the interview methods seems greater than between the two interview methods themselves, both of which rely heavily on aural as opposed to visual communication "(1996, p. 46). Rockwood, Sangster and Dillman (1997) demonstrate that work in this area has been fragmented and that no unified framework for understanding these differences has been developed. Results of mode effect

studies remain inconsistent and so there is still much to be done in this area. Dillman et al conclude that "Based upon our review of the studies, we conclude that with the exception of research on social desirability, evidence is perilously thin about the existence of consistent and predictable differences in responses to mail and telephone surveys." (1996, p. 58) However, they caution that "…too many instances of mode differences have been confirmed to enable researchers to safely ignore the issue." (1996, p. 58) This study is designed to contribute to our understanding of this issue.

The first question that we seek to answer in this study is whether there is evidence that people give different responses to questions about their trust in institutions depending on the mode of data collection, via a mail/postal self-completion questionnaire or telephone using CATI. Previous research has identified three main ways in which mail and telephone survey administration varies potentially influencing responses (Dillman, Sangster, Tarnai and Rockwood 1996; Rockwood, Sangster and Dillman, 1997). The first variation is the level of social interaction present in the mode of administration due to the presence or absence of an interviewer. Self-completed questionnaires have low levels of social interaction while telephone interviews have medium levels of social interaction (as compared to face-to-face interviews where the level of social interaction is high). The presence or absence of an interviewer has been identified as impacting on the effect of 'social desirability' (Groves 1989). For example, Groves and Kahn (1974) found that respondents were more likely to be optimistic in terms of reports of quality of life and satisfaction with life in interviews rather than in self-completion questionnaires. Also, reports of socially undesirable behaviours, such as drinking or gambling, have been observed to be higher in postal completions than in interview modes (Gfroerer & Hughes, 1991; Aquilino & LoSciuto 1990).

The second way that telephone and mail surveys vary is in the communication pathway utilised. Postal surveys rely on visual communication (and consequently literacy rates matter) while telephone surveys rely on aural communication processes. Memory plays an important role in telephone surveys (even more so than in face-to-face which often rely on show cards). Krosnick and Alwin (1987) found that people are more likely to remember the first and last item in a list rather than items in the middle of a list. Therefore, some previous studies have shown that in telephone interviews respondents are more likely to select categories at either end of the scale

rather than in the middle of the scale leading to an 'extremeness' tendency in telephone surveys as compared to postal surveys (Dillman and Tarnai 1992).

The third source of variation lies in whether or not the respondent or interviewer has the locus of control over the pace and speed of questionnaire completion. In telephone interviews the interviewer holds the main locus of control while in postal surveys the respondent holds the locus of control over the process. The time pressure associated with telephone interviews has been argued to foster 'top-of-the head' or quick responses to satisfice the response requirements (Krosnick and Alwin 1987; Feldman 1992; Dillman, Sangster, Tarnai and Rockwood 1996). However, Dillman et al (1996) argue that the results on this issue have been mixed and there is a need for further research.

Scale Effects

The second question that we seek to investigate is: are there differences in survey responses depending on the number of response categories (four versus six response categories)? The reliability of measures of attitudes is also a function of question design including the response scales utilised. It is now widely recognised that response alternatives are not just measurement devices but that they also provide a frame of reference that can impact on respondents' judgements (Schwarz and Hippler 1987; Schwarz and Bless 1991). Respondents have been found to use response scales as information processing tools to estimate and evaluate their own behaviour and the behaviour of others (Schwarz and Hippler 1987). Respondents may use response scales offered to infer what 'usual' behaviour is or they may assume that the 'average' of behaviour is found in the middle of the scale. Therefore, the range of response categories may impact on comparative judgements (Schwarz and Hippler 1987).

The number of response categories has also been shown to impact on survey quality. There is a risk in offering too few response categories where respondent choice may be random. So, for example, three categories — two extremes and a neither one nor the other — may result in random guessing, sometimes caused by rounding error (Lehmann & Hulbert 1972; Alwin And Krosnick 1991). Previous studies have found that longer response scales are preferable to shorter ones but once scales are longer than seven points the meaning of the scale points become ambiguous and this will

increase random measurement (Alwin and Krosnick 1991). Also, the interaction of mode and scale is important because of the impact memory has on the accuracy of response in telephone surveys. If response scales get too long then respondents, without the benefit of visual cues, will find it difficult to keep the response alternatives in their mind. This will create a tendency to use the extremes of the scales in telephone responses. Tarnai and Dillman find that the differences in the use of the response scales are most prevalent for "… vague quantifier response choices of the kind typically found in attitude or opinion surveys. This difference is characterized by a tendency for telephone respondents to give responses at the extreme end of the response continuum, and often at the positive end of the response continuum. Mail survey respondents, on the other hand, are more likely to use the entire range of the response continuum." (1992, p. 118) We therefore, test for extremeness in this current study. In particular, we are interested in whether, as predicted, telephone responses are more extreme than mail responses. In addition, we investigate whether telephone six item response categories show more extremeness than four categories (as would be expected due to the role of memory in telephone administered questionnaires).

Study Design

Four questionnaires were designed to measure trust and confidence "… in this country and the people and organisations in it." We are particularly interested in confidence in organisations and societal institutions.

The following question was asked in all questionnaires:

How much confidence do you have in:

- Banks and financial institutions
- Federal government
- Local government
- Your state government
- The police
- Australian political parties generally
- Universities
- The press and media
- Major companies that do business in Australia

- The legal system
- The education system
- The Australian political system

The response scale varied depending on whether it was 4 or 6.

Two questionnaires have a four category response scale. The four response categories used were:

- A great deal of confidence
- Quite a lot of confidence
- Not very much confidence
- No confidence at all

One questionnaire was a paper based mail version and the other questionnaire was a telephone (CATI) version.

Two questionnaires have a six category response scale. The six response categories used were:

- A very great deal
- A great deal
- Some
- Only a little
- Hardly any
- None at all

One questionnaire was a paper based mail version and the other a telephone (CATI) version.

Survey Description

The data analysed comes from a survey conducted by Deakin University's Computer Assisted Research Facility during the second half of 2004. The purpose was to assess the level of confidence and trust in institutions and groups of individuals in Australia. The survey population was 2,200 entries that were randomly selected from a database of publicly-listed household telephone numbers.

A systematic random sample was drawn. These households were randomly allocated to four groups. First, the sample was divided systematically with every other case

being assigned to the telephone mode of the survey administration condition and the remaining cases to the mail mode.

Second, these sub-samples were again divided systematically into subgroups receiving either questions with the 4 point scale or the 6 point scale.

Table 1. Research design

Scale	Mode	
	Mail	Phone
Scale 4	Mail/Scale 4	Phone/Scale 4
Scale 6	Mail/Scale 6	Phone/Scale 6

Implementation of the mail survey followed the administration principles as outlined in Dillman's total design method (Dillman 1978), except for the final follow-up by express post was not utilized. Therefore, a three stage mail out design was used to minimize losses. The first contact was the questionnaire package, the second contact was a colored reminder/thank you postcard mailed to all respondents one week after the first contact, and the third contact, mailed a further two weeks later to those who had not responded to either of the first two contacts, was a reminder package containing a second copy of the questionnaire. Respondents were provided with reply-paid envelopes each time they were mailed a copy of the questionnaire to make participation as convenient as possible, and each time offered the contact details for the principal investigator should they have any questions or concerns.

The telephone survey was conducted via CATI. 258 respondents completed an interview over the telephone, taking an average of 16 minutes to finish. A further 79 respondents did not feel they had time to complete the interview over the telephone, but did agree for a paper copy of the questionnaire to be mailed to them for completion. 50 of these 79 returned a completed questionnaire. Households were phoned Monday to Friday between the hours of 9:00 and 20:00 and Saturday between 10:00 and 16:00. If a respondent was unable to complete the interview at the time of the call then they were offered first, the opportunity to be phoned back at a more convenient time for them; and, second, to have a copy of the questionnaire mailed to them to complete at their convenience. Households were phoned up to six times in order to obtain a successful connection. The member of the household who had the most recent birthday was targeted but, in order to minimize losses, if this person was

unable to participate then a response was accepted from any member of the household who met the criteria (over the age of 18 years).

In all, 258 respondents completed an interview over the telephone, and 371 respondents returned completed mail questionnaires. From these 629 respondents, we randomly selected 400, 100 from each of the four following conditions:

1. CATI, four response categories
2. CATI, six response categories
3. Mail, four response categories
4. Mail, six response categories

Variables

Of the 18 institutions, occupations and organisations rated by respondents twelve variables were selected for analysis including: the press and media, Australian political parties generally, your state government, local government, banks, Federal government, the legal system, the Australian political system, the education system, universities, major companies, and the police.

The variables were recoded to have a range of 0-100, in order to be able to express effects as percentage point differences. For 4 categories:

100 = A great deal of confidence

66.7 = Quite a lot of confidence

33.3 = Not very much confidence

0 = No confidence at all

For 6 categories:

100 = A very great deal

80 = A great deal

60 = Some

40 = Only a little

20 = Hardly any

0 = None at all

The data were analyzed using MANOVA and the differences reported below are maximum likelihood estimates.

Results

The complete set of results is presented in Table A1, in the appendix. In Table 2 the institutions are ordered by the magnitude of the intercept, where the police are rated highest, and the press and media lowest. The intercept is an estimate of the mean rating for mail survey mode with six response categories, as these are the base categories against which CATI and four categories, respectively, are compared. The coefficients (B) are estimates of the difference between the means of the effect and the base categories (i.e. mail and CATI, and 6 and 4 categories). We also tested for interaction effects, but none were significant.

Table 2. Effects of mode and scale (institutions ordered by magnitude of the intercept)

Institution	CATI	4 cats
The police		-7.17
Major companies	5.67	
Universities	5.60	-5.93
The education system		-8.40
Banks		-7.43
The Australian political system	7.10	-9.90
The legal system		-10.73
Federal government	4.93*	-7.27
Local government	7.00	-6.33
Your state government		-9.17
Australian political parties generally	7.60	-9.93
The press and media		-8.43

* p<.1; all others, p<.05.

CATI produces higher estimates for six of the twelve institutions: major companies, universities, the political system, the Federal government, local government and political parties. The effect of six categories, compared with four, was almost consistently negative (with only 'major companies' showing no effect). A negative estimate means that mean ratings were lower when four categories were used.

In sum, the effect of CATI is contingent on the specific institution being rated, but overall it tends to produce higher ratings than self-completion. Using the 6 response categories consistently produces ratings of about six to eleven percentage points higher than when 4 categories are used.

Analysis of scale effects

Figures 1 through 3 are histograms of the ratings under the four conditions: CATI and 6 item scale, Mail and 6 item scale, CATI and 4 item scale, and Mail and 4 item scale. Tables 3 to 6 are cross tabulations of low and high responses under the four conditions.

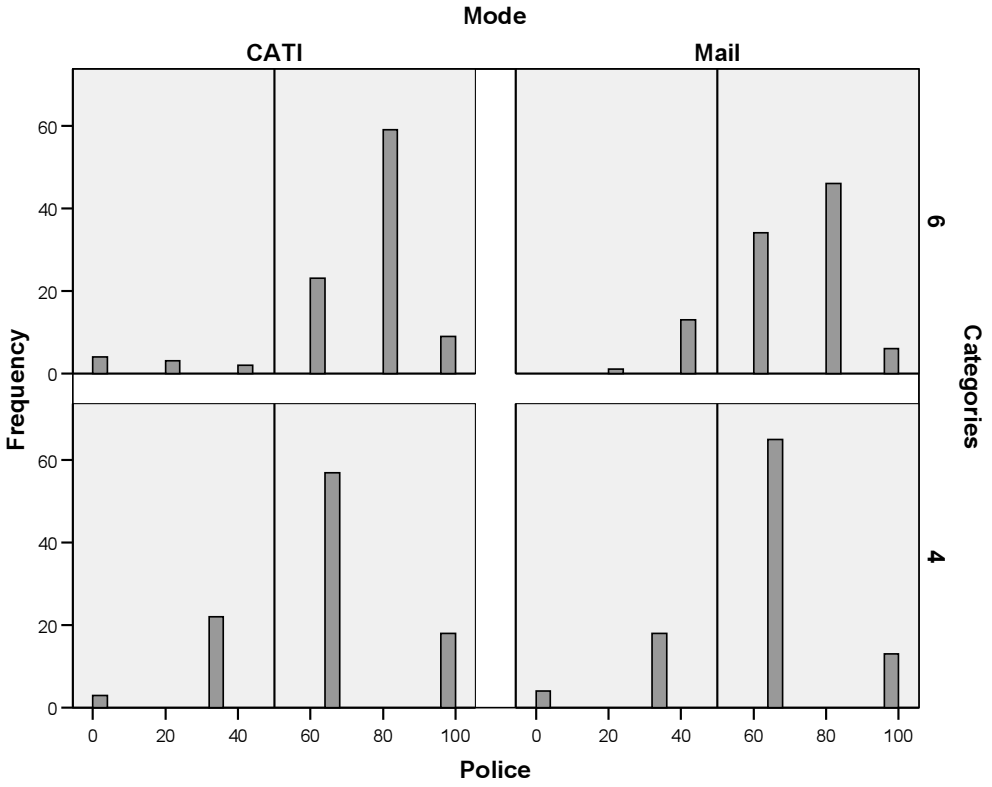

Figure 1: Histogram of ratings by mode and scale - confidence in police

As the histogram in Figure 1 and the Cross tabulation shown in Table 3 show there are no mode effects for confidence in the police but there are scale effects. The six item response scale produces higher overall ratings on this item. The pattern shows the tendency to select the second highest category ("Quite a lot" for the four item scale and "A great deal" for the six item scale) regardless of how it is labelled (the highest categories are "A great deal" for the four item scale and "A very great deal" for the six item scale).

Table 3: Cross tabulation of high and low responses by mode - confidence in the police

		The police		
Mode		Low	High	Total

CATI	Categories	4	25	75	100
		6	9	91	100
Mail	Categories	4	22	78	100
		6	14	86	100

Figure 2 and Table 4 below show the mode and scale effects for "confidence in major companies." There are no scale effects but CATI produces higher ratings than mail. Again, the tendency to use the second highest response category regardless of the label is clear under all four conditions.

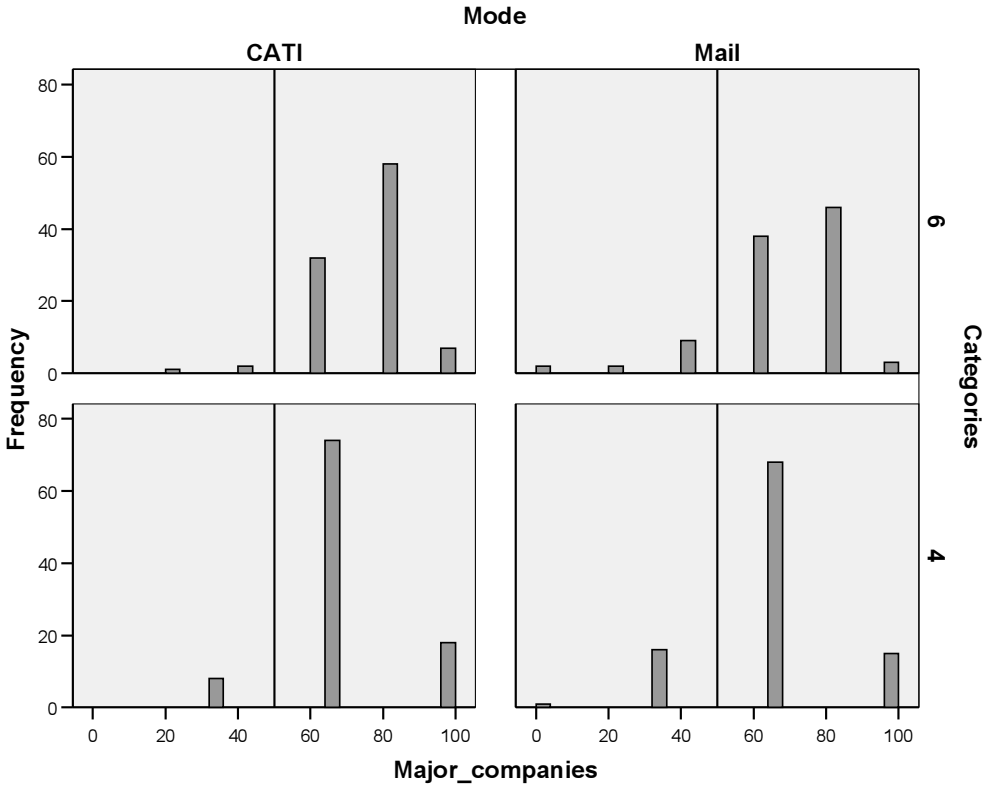

Figure 2: Histogram of ratings by mode and scale - confidence in major companies

Table 4: Cross tabulation of high and low ratings by mode - confidence in major companies

			Major companies		
Mode			Low	High	Total
CATI	Categories	4	8	92	100
		6	3	97	100
Mail	Categories	4	17	83	100
		6	13	87	100

Figure 3 and Table 5 show the strongest effect of mode and scale on ratings for "confidence in the Australian political system." CATI produces higher estimates and

the four category scale produces lower estimates. There is almost a 50% difference in ratings for the CATI, six category group (top left) and Mail, four category group (bottom right).

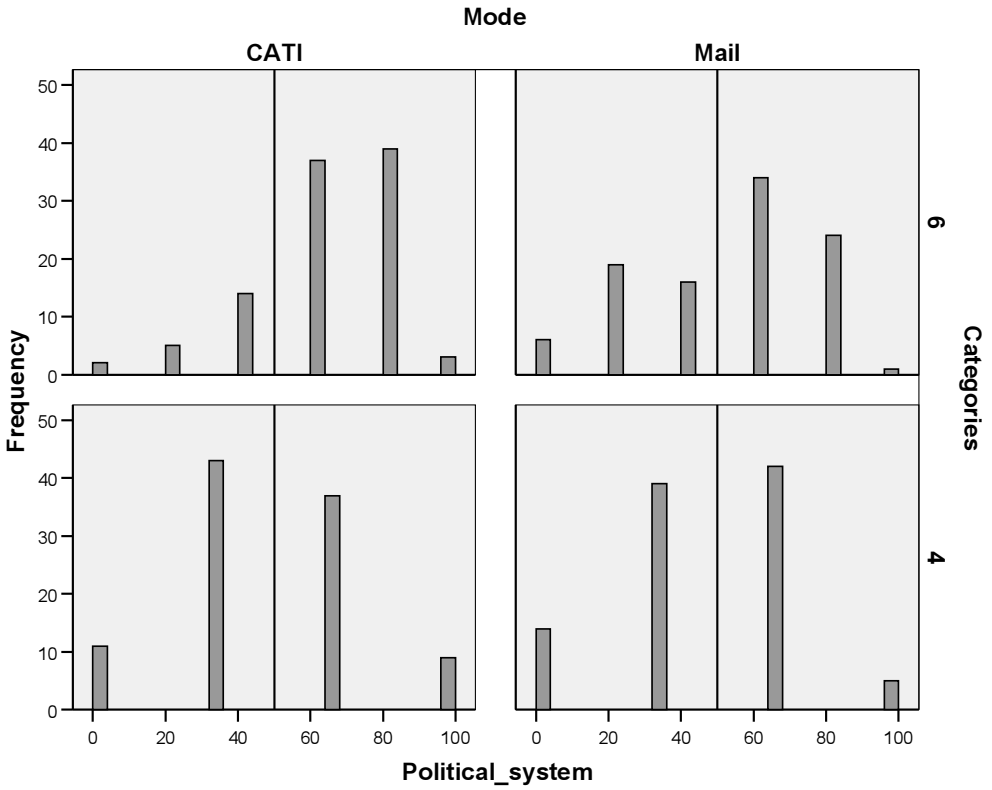

Figure 3: Histogram of ratings by mode and scale - confidence in the Australian political system

Table 5: Cross tabulation of high and low responses by mode - confidence in the Australian political system

			The Australian political system		
Mode			Low	High	Total
CATI	Categories	4	54	46	100
		6	21	79	100
Mail	Categories	4	53	47	100
		6	41	59	100

Discussion

This study confirms that there are mode effects when measuring trust in societal institutions but this is question dependent (in this case institution). This varies depending on the question being asked (in this case the differing institutions) but overall telephone interviews produced higher ratings than self-completion. This is consistent with previous work that has reported that respondents are more likely to be optimistic when they are talking to someone rather than completing a questionnaire on their own (Groves and Kahn 1974). This experiment shows that there are effects due to the presence of an interviewer but that this is different depending on the questions. This lends support to the 'social desirability' effect whereby respondents tend to respond in a way that they consider to be more accepted and legitimate. Past research has shown this effect to be especially strong when the questions are sensitive and require the respondent to report illicit or undesirable behaviours (Knudsen, Pope & Irish 1967; Aquilino 1994). Our experiment shows that mode effects occur even in questions that are not sensitive. In addition, we test this on a large number of questions demonstrating that the strength of the mode effect is question dependent.

The results of this experiment confirm scale effects. The number of categories almost consistently had a negative effect, meaning that the longer the scale (6 categories) the higher the mean ratings. It is clear from this that respondent's use the scales as an information processing tool. Our findings are consistent with the argument that "Offering respondents relatively few response alternatives may not provide enough scale differentiation for reliable mapping of affective reactions toward attitude objects." (Alwin and Krosnick 1991, p. 148). This experiment reveals that anchor points, not labels, are used to determine the rating. The second to highest rating was used more consistently than any others even though these were different ratings depending on whether it was a four or six category scale.

These results provide little evidence of an extremeness effect with CATI administered interviews. CATI tended to produce higher category responses than did mail but respondents did not use the last category more than others. These results do not confirm the prediction that the longer (6 category) scale would produce more extremeness via CATI than the shorter (4 category) scale. In fact, our results indicate more extremeness for the 4 category scale as respondents 'bunch' in their responses due to less choice available. However, neither scale used here is extremely long or

over seven points as indicated by Alwin and Krosnick as becoming 'ambiguous.' Further research to test more extreme scale differences is required to test the premise put forward by Alwin and Krosnick that the number of categories and reliability may be curvilinear. "That is, reliability may increase up to 7-point scales (and possibly somewhat beyond), and may level off or decrease thereafter, so scales with 10 or more points may be no more reliable than 7-point scales." (1991, p.149) However, the effect of mode on very long scales would need to be investigated because of the differences in visual and auditory responses and the role of memory. Alwin and Krosnick (1991) find that with 7-point scales those that are fully labelled are more reliable than those that are not fully labelled. This has particular implications for the way response categories are read to respondents in telephone interviews.

The results of this study show that caution must be exercised when employing multi-mode designs where the intention is to combine the samples to increase cooperation rates and sample size. Multi-mode designs are increasingly popular due to the problems associated with falling response rates. In addition, technological advancements often mean it is relatively easy to set-up and program multi-mode instruments via CATI (telephone), CADI (for self-completion), CAPI (for personal interviewing) and the internet. There is much to be gained from using multi-mode studies in terms of increasing cooperation rates and providing wide flexibility to respondents for participation. However, investigators need to test for mode effects and to make adjustments as necessary prior to substantive analysis. In particular, attention must be given to the variation in mode effects for all types of questions, not just highly sensitive questions.

There are also clear scale effects and again, investigators need to test for these effects if multiple scales are utilised. The longer scale (6 categories) consistently produced higher ratings. This combined with the effect of CATI clearly produces very different findings than the self-completion (lower overall) and four categories (lower overall).

Conclusion

Our aim was to test the effects of survey mode of administration, response scale and the interaction of these on survey response. Our specific interest was in the ability to pool data from different surveys in order to assess change over time. Our results show

that the different surveys cannot be compared directly if modes of administration and response categories vary, even if the questions are the same. A more general issue is the ability to employ multi-mode designs to increase cooperation rates and gain the advantages that flow from the technological ability to administer multiple mode instruments efficiently. These results demonstrate that multi-mode studies need to be designed with recognition of the differences which can result from mode of administration alone, question design and the interaction between the two.

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Appendix 1: Estimates of effects of survey mode and number of response categories on ratings of confidence in 12 institutions

Dependent Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
The press and media	Intercept	40.750	1.897	21.481	.000	37.020	44.480
	CATI	2.700	2.191	1.233	.218	-1.607	7.007
	4 categories	-8.433	2.191	-3.850	.000	-12.740	-4.127
Australian political parties generally	Intercept	41.300	1.876	22.019	.000	37.613	44.987
	CATI	7.600	2.166	3.509	.001	3.342	11.858
	4 categories	-9.933	2.166	-4.586	.000	-14.191	-5.676
Your state government	Intercept	47.817	2.019	23.679	.000	43.847	51.787
	CATI	3.367	2.332	1.444	.150	-1.218	7.951
	4 categories	-9.167	2.332	-3.931	.000	-13.751	-4.582
Local government	Intercept	48.000	2.026	23.697	.000	44.018	51.982
	CATI	7.000	2.339	2.993	.003	2.402	11.598
	4 categories	-6.333	2.339	-2.708	.007	-10.932	-1.735
Banks	Intercept	55.150	2.136	25.824	.000	50.951	59.349
	CATI	-3.100	2.466	-1.257	.209	-7.948	1.748
	4 categories	-7.433	2.466	-3.014	.003	-12.281	-2.585
Federal government	Intercept	50.133	2.313	21.673	.000	45.586	54.681
	CATI	4.933	2.671	1.847	.065	-.318	10.184
	4 categories	-7.267	2.671	-2.721	.007	-12.518	-2.016
The legal system	Intercept	53.267	2.162	24.638	.000	49.016	57.517
	CATI	-.733	2.496	-.294	.769	-5.641	4.175
	4 categories	-10.733	2.496	-4.299	.000	-15.641	-5.825
The Australian political system	Intercept	53.350	2.148	24.836	.000	49.127	57.573
	CATI	7.100	2.480	2.862	.004	2.224	11.976
	4 categories	-9.900	2.480	-3.991	.000	-14.776	-5.024
The education system	Intercept	60.533	1.847	32.783	.000	56.903	64.163
	CATI	2.733	2.132	1.282	.201	-1.458	6.925
	4 categories	-8.400	2.132	-3.940	.000	-12.592	-4.208
Universities	Intercept	66.300	1.663	39.856	.000	63.030	69.570
	CATI	5.600	1.921	2.915	.004	1.824	9.376
	4 categories	-5.933	1.921	-3.089	.002	-9.710	-2.157
Major companies	Intercept	67.267	1.492	45.074	.000	64.333	70.201
	CATI	5.667	1.723	3.288	.001	2.279	9.054

	4 categories	-2.267	1.723	-1.315	.189	-5.654	1.121
The police	Intercept	69.050	1.841	37.497	.000	65.430	72.670
	CATI	1.900	2.126	.894	.372	-2.280	6.080
	4 categories	-7.167	2.126	-3.370	.001	-11.347	-2.986