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Relating Question Type to Panel Conditioning: Comparing Trained and Fresh Respondents

Vera Toepoel
Tilburg University

Marcel Das
CentERdata, Tilburg University

Arthur van Soest
Netspar, CentER,Tilburg University

Panel conditioning arises if respondents are influenced by participation in previous surveys, such that their answers differ from the answers of individuals who are interviewed for the first time. Having two panels – a trained one and a completely fresh one – created a unique opportunity for analyzing panel conditioning effects. To determine which type of question is sensitive to panel conditioning, 981 trained respondents and 2809 fresh respondents answered nine questions of different types. The results in this paper show that panel conditioning mainly arises in knowledge questions. Answers to questions on attitudes, actual behavior, or facts were hardly sensitive to panel conditioning. The effect of panel conditioning in knowledge questions was bigger for questions where fewer respondents knew the answer and mainly associated with the number of times a respondent answered the exact same question before.
Keywords: panel conditioning, re-interviewing, survey design, panel surveys, trained respondents

Introduction

Trained respondents may give different answers to survey questions than those with little or no experience in a panel. This can be due to behavior or knowledge changes induced by previous surveys (e.g. because respondents acquire knowledge on topics addressed in a previous survey) as well as to changes in the question-answering process. Panel members may learn from taking surveys. They may prepare for future surveys (increase their knowledge), or develop attitudes towards certain topics. In addition, they may become familiar with the question-answering process, learn how to interpret questions, and make fewer errors than new respondents. Or the opposite: experienced respondents may also make more errors than fresh respondents – they may speed through the survey or answer strategically to avoid followup questions. This paper investigates which type of question is sensitive to panel conditioning, comparing the answers of fresh and experienced panel respondents to nine questions of different types.

Background

One of the basic decisions in survey design is whether to use trained respondents (using a panel with repeated interviews of the same people) or fresh respondents (e.g. a repeated cross section). Sharot (1991) discusses advantages and disadvantages of panels. There are two important methodological issues associated with the use of panel surveys: panel attrition and panel conditioning. In this paper we focus on the latter issue. Panel conditioning arises if having been interviewed previously causes differences in knowledge, behavior, or attitude, affecting the answers in later interviews. Frequently cited reasons why panel conditioning might occur are that respondents become more knowledgeable as a function of information imparted through the interview, prepare for future surveys, reflect and deliberate more closely on an issue, or learn the requirements of the response process.

Knowledge The introduction of a topic in an interview may strengthen awareness and increase knowledge of the topic in a later interview. Battaglia, Zell, and Ching (1996) find a panel conditioning effect in a vaccination survey covering young children. Respondents became more aware of the vaccination program which increased the percentage of children with vaccination after the interview. Coombs (1973) shows that differences in knowledge of contraception exist between trained and fresh respondents. Das, Toepoel, and Van Soest (2007) also demonstrate on several multiple wave studies that respondents' knowledge increased in later waves.

Preparation Panel respondents might feel obliged to prepare for future surveys, leading to answers that are systematically different from those of fresh respondents. Clinton (2001), however, did not find evidence that respondents would acquire additional information in the media or that trained respondents would have higher media consumption. He also found that trained and fresh respondents had equal interest in politics and public affairs and did not have systematically different opinions about public or political matters. Dennis (2001) found no significant relation between

Contact information: Vera Toepoel, Warandelaan 2, P.O. Box 90153, 5000LE Tilburg, The Netherlands, e-mail: v.toepoel@uvt.nl

attitudes toward politics and tenure in a panel, but panelists with tenure of one month or less did report slightly higher levels of watching or reading news as well as using the Internet. New panel members had elevated consumption of news during the first month of panel participation but then went back to pre-panel behavior.

Deliberation Sturgis, Allum, and Brunton-Smith (2007) discuss a potential theory behind panel conditioning: the cognitive stimulus hypothesis. Questions about certain topics may induce respondents to reflect on the topic after the interview, to talk about them with friends and relatives, or to acquire additional information. These processes of public and private deliberation may induce adopting a different attitudinal position than would have been the case in the absence of the first interview. Their empirical analyzes show that attitude items become more reliable and more stable over time and opinionation and interest in social and political issues increase due to repeated interviewing. Using panel surveys (and not accounting for this effect) would then lead to overestimating the political sophistication, engagement and opinion strength of the general public. Waterton and Lievesly (1989) find that respondents become more "politicized", report more honestly and become less likely to answer "don't know" as a result of participation in earlier questionnaires. Brannen (1993) also finds that respondents became more politicized due to re-interviewing. The evidence of panel effects in these studies is in contrast with the results of Dennis (2001) and Clinton (2001) who essentially found no panel effects.

Learn about the response process According to Trivellato (1999), panel participation mainly affects the way in which behavior is reported (the response process), while it does not have pervasive effects on behavior itself. Mathiowetz and Lair (1994) found evidence that respondents become familiar with the question-answering process and adjust their responses accordingly. They hypothesized that a decline in the reported prevalence of difficulties with daily life activities in a subsequent survey wave was due to panel conditioning. Respondents learned in the first wave that for every reported difficulty there was a series of follow-up questions, and they therefore altered their responses in the subsequent wave to avoid the follow-up questions. Meurs, Van Wissen, and Visser (1989) also found that experienced respondents respond strategically, for instance after learning that answering "no" means evading follow-up questions, thereby reducing the burden of their task. This is in line with the results of Duan et al. (2007), who found underreporting in the use of social services. Coen, Lorch, and Piekarski (2005) found no evidence that frequent responders would try to speed through the survey. They found a relatively high number of marks on check-all-thatapply questions. Inexperienced panelists more often chose socially desirable answers. This is in line with the results of Dennis (2001).

Panel conditioning effects may depend on the type of question being asked. Coombs (1973) found differences in knowledge of contraception between trained and fresh respondents, but found no effect of re-interviewing on (fertility) behavior or attitude. Das et al. (2007) also found panel conditioning in knowledge questions, but not in other types of questions, referring to actual behavior or circumstances, attitudes and opinions, or future expectations.

Golob (1990) concluded that no panel conditioning effects exist in questions that require simple reporting tasks, implying that panel conditioning relates to the cognitive difficulty in answering questions. He found no panel conditioning effects in simple questions on car ownership, but he did find panel conditioning effects for more cognitively demanding questions on, e.g., travel times for different modes of transport. Pennell and Lepkowski (1992) found hardly any evidence of panel conditioning in income sources reported in the Survey of Income and Program Participation.

Wang, Cantor, and Safir (2000) found panel conditioning effects in a second wave in four out of 32 variables: child participation in extracurricular activities (factual question), adults reporting food insecurity (attitudinal question), confidence in getting medical care (attitudinal question), and whether the respondent had heard of Medicaid (knowledge question). Their results suggest that panel conditioning affects several types of questions. Van der Zouwen and Van Tilburg (2001) argue that panel conditioning effects sometimes do and sometimes do not appear, without a clear indication of the conditions under which these effects occur. In order to investigate which type of questions are sensitive to panel conditioning we conducted an experiment on both a trained and a completely fresh panel and compared results.

Design and implementation

To study the relation between panel conditioning and question type, we used two online household panels administered by CentERdata (see www.centerdata.nl and Appendix A for more details about these panels). Both panels are representative of the Dutch population aged sixteen and over. The first, the CentERpanel, exists since 1990. Panel members fill out questionnaires every week. At the time of our survey, panel duration of respondents varied between (almost) seventeen years and a few months (the mean duration is 6 years and 8 months; the standard deviation is 4 years). Although the CentERpanel is an Internet-based panel, there is no need to have a personal computer with an Internet connection. If necessary, equipment is provided by CentERdata. The recruitment of new panel members is done on a random sample of landline numbers of candidates. If a household drops out of the panel, a new household is selected from a database of potential panel members on the basis of demographic characteristics.

The second panel is the new LISS-panel. Panel members complete questionnaires on a monthly basis through the Internet. As with the CentERpanel, Internet access is not a prerequisite for participation. The recruitment of panel members is based on a random sample of addresses drawn from the community registers in co-operation with Statistics Netherlands. Our questions were included in the first questionnaire presented to respondents in this panel. We fielded the questionnaire in June 2007. The fieldwork was one week

for the trained panel and one month for the fresh panel (since respondents fill out questionnaires every week in the trained panel and every month in the fresh panel).

Appendix B presents the response numbers. To correct for differences due to unit non-response, we used weights based upon sex, age, and education (see Appendix B for the response distribution after weighting). Item non-response was negligible (less than 1%).

We used nine questions on two different topics: food infection and old age pensions.[1] These topics had already been asked to the trained panel several times (and not to the fresh panel, because this was their first questionnaire). The answers in the trained panel may therefore be affected by panel conditioning, either because they have already seen the same questions, or because their panel experience in general (not specifically the questions we discuss here) has affected their response behavior.

Results

Table 1 presents the nine questions and the distributions of the answers in the two panels. All questions can be answered with yes or no only. The trained and fresh respondents answer the knowledge[2] question about campylobacter[3] significantly different: 25.2% of the trained panelists report that they know what campylobacter is compared to 13.9% of the fresh panelists.This is in line with the literature stating that trained respondents are more likely to be familiar with the targeted subject because they have been asked the questions before. The question whether respondents know what salmonella is does not give significant differences between the two panels, probably since salmonella is quite well-known (more than 98% of both panels say they know what it is). For cross-infection, the two panels differ significantly: 80.9% of the trained panelists say they know what cross-infection is compared to 76.4% of the fresh panelists. The difference between panels for this question is not as large as the difference for the question about campylobacter, which is a less well-known concept. We also found significant differences in the answers to the question about "Stichting Pensioenkijker", a foundation which aims at promoting pension awareness of the Dutch population. Almost twice as many trained respondents compared to fresh respondents reported they had ever heard, seen, or read something about this association (39.7% of the trained panelists versus 22.0% of the fresh panelists).

The answers to the other types of questions (attitude, fact, and behavior) in Table 1 were not correlated with panel experience. Thus, our results suggest that only knowledge questions are sensitive to panel conditioning. The difference between trained and fresh respondents increases with the percentage of respondents who do not know the concept the question refers to.

To find out if the differences between the trained and fresh panel relate to respondent characteristics we conducted some probit analyses. Tables 2 and 3 show the results. Table 2 presents the estimation results for the questions with significantly different frequencies of 'Yes'-answers in the trained and fresh panel.

In the probit models the answer to each question is explained by a panel dummy (freshpanel = 0 for the trained panel, 1 for the fresh panel), education, age, and sex of the respondent, and interaction terms of the panel dummy with these personal characteristics. The personal characteristics are included as deviations from their (overall) sample means, implying that the coefficient on the panel dummy can be interpreted as the panel conditioning effect for the average respondent. The results for Probit 1 in Table 2 show that the panel conditioning effect remains significant if we correct for personal characteristics. We found no significant interaction terms, except for question five ("Did you ever hear, see, or read something about 'Stichting Pensioenkijker'?"). In particular, the panel conditioning effect for this question declines with age, suggesting that the younger people know more about their pension as a result of having been interviewed. Since we also find that pension knowledge increases with age (cf. the positive age coefficient in Probit 1, Table 2), this is in line with the earlier finding that the panel conditioning effect in knowledge questions falls with the fraction of respondents who know the concept. It should be noted that the finding that pension knowledge increases with age seems plausible, since pensions matter more the closer respondents are to the age of retirement. Still, the age relationship we find here seems largely absent in the US – see, e.g., Starr-McCluer and Sunden (1999) and Chan and Stevens (2008, footnote 19).

To find out whether how long respondents already participate in the panel influences the extent of panel conditioning, we conducted additional probit analyses (detailed results not reported). Neither linear nor categorical measures of panel duration were significant when added to the probit models.

Questions one, three, and five were presented to the trained panel in previous questionnaires in exactly the same way as in this experiment (the other questions were presented to the trained panel several times, but not with exactly the same wording). Therefore, we can also include the number of times each panel member has received these exact same questions.

Questions one and three were presented to the trained panel twice before: 32.8% of the trained panel members

[1] These questions were embedded in a questionnaire with three experiments on design issues. The questionnaires in both panels were exactly the same, both in content and in appearance. There was a difference in mean duration of the entire interview between panels (t=-2.4, p=.02): 436 seconds for the trained panel and 576 seconds for the fresh panel (where means were calculated after deleting outliers with more than twice the standard deviation; 28 respondents in the fresh panel and 4 in the trained panel).

[2] In this paper we use the term "knowledge question" to refer to questions which ask whether or not a respondent knows the meaning of a particular term or is familiar with a particular issue. These questions can also be classified as "awareness questions" but we use the term "knowledge question" to stay in line with the existing literature (see the discussion in the section "Background").

[3] Campylobacter is a bacterium found in the intestines of many types of animals and is the most common bacterial cause of diarrheal illness.

Table 1: Comparison of answers of trained and fresh respondents to various Yes/No questions

	Type of question	% Yes Trained panel	% Yes Fresh panel
1. Do you know what Campylobacter is?	Knowledge	25.2	13.9*
2. Do you know what Salmonella is?	Knowledge	98.3	98.4
3. Do you know what Cross infection is?	Knowledge	80.9	76.4*
4. Did you think about your age of retirement the last year?	Behavior	60.5	59.1
5. Did you ever hear, see, or read something about "Stichting Pensioenkijker"?	Knowledge	39.7	22.0*
6. Do you think pensions will be higher about ten years from now?	Attitude	24.1	26.8
7. Do you think people will be more satisfied with their pensions about ten years from now?	Attitude	10.2	9.6
8. Do you think many people will retire partially in the future?	Attitude	64.0	62.8
9. Are you retired?	Fact	21.8	20.9

* Difference between trained and fresh panel is significant (p<.01).

in our experiment answered these two questions once before, 49.6% answered them twice before, and the remaining 17.6% of respondents of the trained panel never answered these specific questions before. Question five was presented four times before: 5.6% of the trained panel never answered this question before, 9.6% already answered the exact same question once, 19.2% twice, 29.1% three times, and 36.6% already answered it four times before. Results of a probit including the number of times a respondent already answered the same question as an additional explanatory variable (the variable *Same Question*) are presented in Probit 2 in Table 2. The variable *Same Question* has a positive and significant effect, while the effect of the panel dummy is no longer significant. This leads to the conclusion that the number of times the exact same question is answered before influences the extent of panel conditioning, not the type of panel as such (fresh of trained) or the panel duration.

Table 3 presents the estimation results for the questions on which the trained and fresh panel showed no significant different frequencies of Yes- answers. The panel conditioning effect for the average respondent remains insignificant if we control for respondent characteristics. We do, however, find a significant effect of the interaction of the panel dummy with education level in question four ("Did you think about your age of retirement last year?"). Respondents with higher education tend to think more about their age of retirement than low educated respondents (keeping age and sex constant), but the difference is much larger in the experienced panel than in the fresh panel. Since the first order effect of the panel dummy is virtually zero, this suggests that an interview about pensions triggers respondents with higher education to think about their retirement age, but would have the opposite effect for the lower educated. This could be explained by the fact that higher and lower educated people typically have jobs that pay differently. Because of the salary discrepancies, it may be that higher educated people can focus on longer-term goals (such as pensions) while lower educated people focus more on short-term ones.

For question nine ("Are you retired?") we changed the definition of the variable age to account for the discontinuous relation between the fact whether the respondent is retired or not and age. Because in the Netherlands the benchmark age of retirement is 65, we replaced age by a dummy variable which equals 1 if the respondent is 65 years or older and zero otherwise. The estimation results in Table 3 show that the answer to this factual question is largely explained by this dummy variable with no evidence of any panel conditioning effect.

Finally, to check whether the observed differences between the two panels reflect different sample compositions due to attrition in the trained panel, we added a broader range of controls (such as variables about occupation, health, household composition, number of household members, number of children in the household, income, region etc.). This hardly changed the estimates of the other coefficients and had no effect on the qualitative conclusions concerning panel conditioning.

Concluding remarks

It is important to understand issues related to panel conditioning and their potential impact on the quality of survey answers. Panel research gives big advantages, but the fact that the panel is the foundation on which research projects are built, and trained respondents may respond differently than fresh respondents, causes concerns with regard to survey quality. This paper shows that knowledge questions, especially on less-known topics, are strongly affected by panel conditioning. When asking this kind of questions, a researcher has to be particularly careful about the kind of sample used. We found that other types of questions are less sensitive to repeated interviewing. The results show that the difference (or absence of the difference) between the trained and fresh panel is hardly associated with education, age, or sex.

A closer look distinguishing between trained panel members who have been asked the specific questions in our

Table 2: Probit estimates for (knowledge) questions with significantly different frequencies in trained and fresh panel[a]

Question	1 (Campylobacter)	3 (Cross infection)	5 (Pensioenkijker)
Probit 1			
freshpanel	-.797**	-.271**	-.867**
edu	.231**	.121*	.055
age	.015	-.076	.129**
sex	.109	.184	-.295*
freshpanel*edu	.045	.093	.001
freshpanel*age	.104	.049	.165**
freshpanel*sex	-.072	-.013	.095
constant	-1.089**	1.500**	-.382**
Probit 2			
freshpanel	-.243	.034	.363
edu	.222**	.112*	.023
age	-.054	-.123*	-.006
sex	.158	.208	-.263
freshpanel*edu	.053	.103	.033
freshpanel*age	.174*	.096	.300**
freshpanel*sex	-.121	-.036	.063
SameQuestion	.427**	.256*	.450**
constant	-1.643**	1.195*	- 1.612**

*p<0.05

**p<0.01

[a]Exact questions are defined in Table 1. Freshpanel is coded as 0=trained panel, 1=fresh panel. The variable SameQuestion indicates the number of times the respondent has answered exactly the same question before. Other explanatory variables are defined in Appendix B and are included in the model as deviations from their (overall) means.

Table 3: Results for questions with no significant differences of the proportion of 'Yes'-answers between trained and fresh panel[a]

Question	4(B)	6(A)	7(A)	8(A)	9(F)
freshpanel	-.004	.096	-.184	-.118	-.141
edu	.426**	-.036	-.081	.124**	-.095
age[b]	.298**	.113*	.115	.111*	6.781**
sex	-.081	-.568**	.021	-.006	-.039
freshpanel*edu	-.186**	-.040	-.106	-.004	-.032
freshpanel*age[b]	.069	-.062	-.072	-.090	-.720
freshpanel*sex	-.288	.082	-.230	-.008	-.607
constant	.564**	-1.207**	-2.202**	.648**	-2.647**

*p<0.05

**p<0.01

[a]Questions are defined in Table 1; K stands for 'Knowledge', B=Behavior, A=Attitude, and F=Fact. The probit estimation results for question 2(K) are omitted since the variable is too skewed to be suitable for probit analysis. Freshpanel is coded as 0=trained panel, 1=fresh panel. Other explanatory variables are defined in Appendix B and are included in the model as deviations from their means.

[b]For question nine the variable age is replaced by a dummy variable instead of a categorical variable; age=1 if the respondent is 65 years or older, 0 otherwise.

experiment a different numbers of times reveals that the panel conditioning effects we find are not due to panel experience in general, but to having answered the same question before. For a question of the form "have you heard of ...." (one of the questions in our experiment) this may seem tautological, since respondents may simply remember the term from their previous interview, although they do not know what it means. Most of our questions, however, are of the form "do you know what ... is?". Here the most likely interpretation of the panel conditioning effect seems that asking the question makes respondents aware of the topic and induces them to acquire more information, an effect on their behavior that causes an actual change in their knowledge at the time of the re-interview.

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Appendix A: Description of the panels

This appendix gives some details about the trained panel (CentERpanel) and the fresh panel (LISS panel). Both panels are administered by CentERdata, a research and data collection institute affiliated with Tilburg University, The Netherlands. For the trained panel we will in particular focus on the recruitment of new members (to correct for attrition) and for the fresh panel we will provide some details on the original set-up.

CentERpanel (see also http://www.centerdata.nl/en/CentERpanel)

The CentERpanel was established in 1990 and consists of over 2000 households. The panel is aimed to be representative of the Dutch-speaking population in the Netherlands. Panel members complete questionnaires at home every week through the Internet. Although the CentERpanel is an Internet-based panel, there is no need to have a personal computer with an Internet connection. The households that do not have access to Internet when recruited, are provided with a so-called Net.Box, with which a connection can be established via a telephone line and a television set. If the household does not have a television, CentERdata provides that too.
The recruitment of new panel members is done in three stages. In the first stage, a random sample (landline numbers) of candidates is interviewed by telephone. In the first telephone interview a number of questions are asked about demographic characteristics of the household. The interview ends with the question whether the person would like to participate in survey research projects. If so, the household is included in a database of potential panel members. If a household drops out of the panel, a new household is selected from the database of potential panel members. This is done on the basis of demographic characteristics (such that the panel will remain representative of the Dutch-speaking population). The selected household is asked whether the members of the household would like to become panel members. If so, a number of additional questions are asked and, if necessary, equipment is provided.

LISS panel (see also http://www.centerdata.nl/en/LISSpanel)

The LISS panel was established in 2007 and consists of about 5000 households. At the time of the study presented in this paper recruitment was not completely finished yet, but the first questionnaires were fielded. Panel members complete questionnaires at home every month through the Internet. As with the CentERpanel, Internet access is not a prerequisite for participation. If a household does not have Internet access at the time of recruitment, he or she is provided with a so-called SimPC (a basic PC with the ability to surf the Internet and some other basic functionalities).
The LISS panel is representative of the Dutch speaking population in the sense that the first recruiting of respondents was based on a random, nation-wide sample of 10.600 addresses drawn from the community registers in co-operation with Statistics Netherlands. In a first step, all households in the sample receive an announcement letter and a brochure explaining the nature of the panel study. A prepaid incentive of €10 is added. Next, households are contacted by an interviewer, either by telephone or face-to-face, depending on whether a landline number is available. In a 10-minutes recruitment interview some basic information is collected and at the end, the request to participate in the panel is made.
Within one to two weeks after the interview the respondents who agree to participate in the panel receive a confirmation e-mail and a letter with login code, an information booklet and an answer card. Respondents without Internet or computer can confirm their willingness to participate by sending back the signed answer card, and the necessary equipment will be installed in their home. Respondents with Internet access can choose to confirm in the same way or to confirm online with the login code provided in the letter. In the latter case they can immediately start the first interview. This confirmation procedure ensures the double consent of each respondent.
Respondents who are initially not reached are re-contacted a number of times, first by phone (in case a landline number is available) and then if necessary, face-to-face. If they are not reached after 15 face-to-face visits either, they receive a new invitation letter including a link to the Internet version of the recruitment interview, or a shortened paper version of the questionnaire.
The attempt is made to convert (soft) refusals into participation by a tailored procedure, depending on the refusal type. For example, older individuals who feel a bit unsure are offered a video demonstration in their home with a clear explanation of how the SimPC works.

Appendix B: Response rates in percent (before and after weighting)

		Trained Panel			Fresh Panel		
	Pop. Distr.*	Selection Panel members	Response	Response after weighting	Selection Panel members	Response	Response after weighting
Overall			71.7			67.7	
Sex							
0. Male	49.5	50.5	55.1	49.4	46.2	46.1	49.5
1. Female	50.5	49.5	44.9	50.6	53.8	53.9	50.5
Age							
1. 15-24	13.3	6.7	5.8	12.9	12.0	13.0	14.9
2. 25-34	15.6	20.3	13.9	15.5	16.4	17.0	16.4
3. 35-44	19.7	19.4	20.6	19.9	22.0	22.5	19.9
4. 45-54	18.0	20.2	21.2	18.1	21.2	21.9	17.5
5. 55-64	15.4	17.2	19.5	15.5	17.5	17.4	15.6
6. 65 and older	18.0	16.2	19.1	18.0	10.9	8.2	15.7
Education							
1. Primary	9.5	6.9	5.2	9.2	11.2	11.0	9.5
2. Lower secondary	24.8	26.7	26.5	24.8	28.0	27.4	24.8
3. Higher secondary	10.8	12.4	12.2	10.9	9.5	9.5	10.8
4. Intermediate vocational	29.4	20.6	19.6	29.5	23.7	24.4	29.4
5. Higher vocational	16.3	22.8	25.3	16.4	20.3	20.6	16.3
6. University	9.2	10.6	11.2	9.2	7.3	7.0	9.2
Number of Respondents		1369	981		4149	2809	

* Population distribution, Source=Statistics Netherlands