

## A Note on How Prior Survey Experience With Self-Administered Panel Surveys Affects Attrition in Different Modes

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# A Note on How Prior Survey Experience With Self-Administered Panel Surveys Affects Attrition in Different Modes

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## Abstract

Attrition poses an important challenge for panel surveys. With respect to these surveys, respondents' decisions about whether to participate in reinterviews are affected by their participation in prior waves of the panel. However, in self-administered mixed-mode panels, the way of experiencing a survey differs between the mail mode and the web mode. Consequently, this study investigated how respondents' prior experience with the characteristics of a survey—such as length, difficulty, interestingness, sensitivity, and the diversity of the questionnaire—affects their informed decision about whether to participate again or not. We found that the length of a questionnaire seems to be of such importance to respondents that they base their participation on this characteristic, regardless of the mode. Our findings also suggest that the difficulty and diversity of questionnaires are readily accessible information that respondents use in the mail mode when making a decision about whether to participate again, whereas these characteristics have no effect in the web mode. In addition, privacy concerns have an impact in the web mode but not in the mail mode.

## Keywords

panel attrition, survey experience, web survey, mail survey, mixed-mode, self-administered survey

Panel surveys have become increasingly important for social science research. However, although these data enable analyses of individual change and causal inferences by controlling for time-invariant unobserved heterogeneity, panel surveys are challenged by attrition (Lynn, 2009). *Panel attrition* occurs when panelists do not participate in reinterviews. Previous research has suggested that attrition is not entirely random but varies systematically between respondents and can introduce a risk of attrition bias that may lead to erroneous substantive conclusions. Previous studies have shown that respondents who are hard to contact (e.g., due to plans to move, bad health, precarious

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life circumstances; Lemay, 2009) or who have provided short or negative comments at the end of a survey (McLauchlan & Schonlau, 2016) are less likely to participate in the next wave of a panel survey. Moreover, previous studies have reported mixed findings about which sociodemographics and attitudes are related to panel attrition (cf., Lemay, 2009; Lugtig, 2014; McLauchlan & Schonlau, 2016). Even if bias is absent, attrition reduces the number of observations and thus lowers the statistical power of survey data. Despite all the research that has been done on attrition processes, we still require more knowledge about what drives panel attrition so to be able to counteract this process, for instance, by employing adaptive or responsive designs (Groves & Heeringa, 2006; Schouten, Calinescu, & Luiten, 2013; Tourangeau, Brick, Lohr, & Li, 2017). Employing an adaptive design to tackle attrition requires that researchers identify the means for stimulating future participation. In other words, researchers need to be able to control and modify these means.

With respect to panel surveys, respondents' decisions about whether to participate in reinterviews are affected by their participation in prior waves of the panel (cf., Laurie, Smith, & Scott, 1999; Lemay, 2009; Lugtig, 2014; Struminskaya, 2014, chapter 4). From prior research, we have learned that survey participation depends on how interesting, important, and difficult the topic appears to respondents (Goyder, 1986; Groves, Presser, & Dipko, 2004; Rogelberg, Fisher, Maynard, Hakel, & Horvath, 2001), privacy concerns (Couper, Singer, Conrad, & Groves, 2008; Marreiros, Tonin, Vlassopoulos, & Schraefel, 2017; Stocké, 2006), and length of the questionnaire (Galesic & Bosnjak, 2009; Hill & Willis, 2001; Loosveldt & Storms, 2008; McLauchlan & Schonlau, 2016). In contrast to cross-sectional surveys, panelists have experience with prior interviews in the panel and thus can be expected to draw on these memories to decide whether to participate in future panel waves. However, we argue that being able to draw on these memories requires that respondents have the respective information accessible during their decision-making process about whether to participate.

Recently, we have observed an increasing use of self-administered modes (i.e., web and mail) in panel surveys. Due to rising costs, lower speed of data collection, and lower time and geographic flexibility of face-to-face interviewing (Callegaro, Manfreda, & Vehovar, 2015, pp. 18–25), the provision of panelists with self-administered survey modes has been deemed viable for large-scale panel surveys such as the GESIS panel (GESIS, 2017), Longitudinal Internet Studies for the Social Sciences (LISS) panel (Scherpenzeel & Das, 2010), and Understanding America Study.<sup>1</sup> With respect to these surveys, respondents complete their interview via a mail questionnaire or a web questionnaire using a smartphone, tablet, or personal computer.

Although mail and web are both self-administered modes, the process of completing a questionnaire in these two modes differs substantially. A mailed paper questionnaire (mail mode) is visible in its full length to respondents who manually turn the pages and fill in answers with pens. When using the web mode, respondents answer questions by using a device (i.e., smartphone, tablet, or personal computer) and are forwarded from one web page to the next. In most web surveys, the entire questionnaire is not visible to respondents.

Prior research on cognitive learning has shown that how we interact with objects facilitates the memorization of their properties (Easton, Greene, & Srinivas, 1997). Some researchers have argued that haptic (or “tactile”) interaction opens up additional modes of information processing, compared with using only visual inspection (Klatzky, Lederman, & Reed, 1987; Minogue & Jones, 2006). In other words, a haptic interaction with an object helps individuals to better memorize the properties of that object (Desmarais, Meade, Wells, & Nadeau, 2017; Easton et al., 1997).

Survey participation using a mail mode requires a haptic interaction with a paper questionnaire, whereas a web mode interaction is purely visual. Consequently, information on the manifest characteristics of a prior mail questionnaire—such as difficulty, length, and diversity—should be readily available to panelists who are participating using a mail mode. We expect that due to the availability of this information, respondents base their decisions to participate in the next wave of a panel survey

(i.e., the next reinterview) on how they experienced the previous questionnaire. In other words, we expect that respondents' perception of a previous mail questionnaire will impact their decisions about whether to participate in a next wave. Thus, a positive perception should lead to a more likely participation in a subsequent wave. When participating via a web mode, respondents operate their computer, but their experience of the questionnaire is solely visual. With respect to this mode, information about previous questionnaire characteristics should be less readily accessible to panelists. Accordingly, when using a web mode, we expect that respondents will be less likely to draw on these characteristics when making their decisions about whether to participate in reinterviews.

To our knowledge, previous research has not examined the mechanisms of mode differences with respect to how prior experiences with a survey can affect later panel attrition. This lack of research is particularly unfortunate since individual survey experience can be controlled and modified by a researcher. For example, researchers can reduce the length of a questionnaire, apply gamification to increase engagement, adjust the difficulty of questions, issue motivational statements, address privacy concerns with tailored information brochures, and vary the diversity of questionnaire content. To address this research gap, the present study analyzed the impact of prior survey experience on participation in subsequent panel waves. In addition, we investigated whether different survey experiences are considered by respondents in the mail and web modes.

## Data and Method

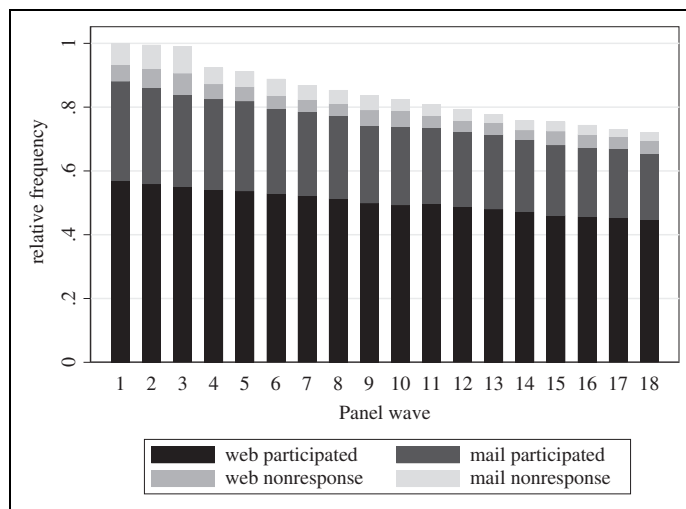
In this study, to address our research questions, we relied on data from the GESIS panel (GESIS, 2017), which is a probability-based mixed-mode panel survey carried out in Germany (cf., Bosnjak et al., 2018). The respondents of the GESIS panel participate by the mail or web mode and were free to choose their mode of participation (i.e., respondents self-selected into modes). In the first wave of the panel in 2014, 62% of the respondents participated by using the web mode and 38% used the mail mode.

Before the GESIS panel became fully operational in 2014, respondents were recruited in face-to-face interviews based on a register sample with a Response Rate 5 of 38.6% in the recruitment interview (AAPOR, 2016). During these face-to-face interviews, respondents were given a choice to participate by the mail mode or the web mode. In 2014, the panel started with 4,888 respondents who have been reinterviewed every 2 months since then (i.e., 6 times per year). For our analysis, we used data from all 18 panel waves conducted between 2014 and 2016.

Of the initial 4,888 respondents, 72% were still active panelists before the last wave in 2016. We excluded three respondents who switched their survey mode, but we kept partial responses in our sample. Figure 1 shows the number of active panelists, responses, and nonresponses for the 18 panel waves by modes.

To assess how respondents experienced their previous panel interview, we relied on a question battery that was included in each wave of the GESIS panel. This battery featured 6 items concerning how the respondents perceived the different characteristics of the survey (see Appendix A). These items addressed the following characteristics of the questionnaire: interestingness, diversity of questions, importance for science, length, difficulty, and whether the questionnaire was too personal. The GESIS panel measured each item on a fully labeled 5-point scale from "not at all" to "very," which we rescaled from 0 to 4 for analytical purposes. In our analysis, these variables served as independent variables.

Since we wanted to examine the influence of prior survey experience on participation in the next survey wave, our dependent variable was *participation in a corresponding wave* (0 = no, 1 = yes), although the survey experiences were derived from the last wave in which a respondent participated. For example, we used the survey experience from Wave 1 to explain participation in Wave 2. In our longitudinal analysis (see following discussion), we applied this logic to all respondents for each of



**Figure 1.** Survey participation by modes across panel waves (2014–2016). Relative frequencies based on number of panelists in the first wave ( $N = 4,888$ ).

the 18 waves. Accordingly, we used the survey experience of Wave 17 (or the last wave in which a respondent participated) to explain participation in the 18th wave and so on.

Due to our binary dependent variable (i.e., participation in a panel wave) and the fact that we relied on panel data, we decided to compute fixed effects logistic regression models for each mode. The use of fixed effects panel regression enabled us to draw on the beneficial properties of our data to account for time-invariant unobserved heterogeneity (Allison, 2009). Since our respondents selected their own mode of participation, we were devoted to controlling unobserved heterogeneity as best as we could (e.g., to control for differences in sample composition between modes due to self-selection). Fixed effects models subtract time-invariant factors from the regression equation and thus control for them (cf., Allison, 2009). For instance, all respondent characteristics that did not change across the 18 waves of the panel—such as age, gender, and education—were automatically controlled and were not included in the regressions. A further reason for using a fixed effects model was that we were interested solely in modeling the effects of time-variant predictors (i.e., prior experience with a panel wave) and not in ascribing (non)respondents with time-invariant characteristics (e.g., age). Thus, we decided against using a random effects panel regression or a hybrid approach (Allison, 2009) that would allow for including time-invariant predictors, but which would require stronger assumptions regarding unobserved heterogeneity. For each regression, we modeled respondents' likelihood to participate in a wave of the panel, which was conditional on their evaluation of the last questionnaire they had completed.

## Results

The results of our fixed effects panel regression models for the mail and web modes are detailed in Table 1.

In line with our assumption that memorizing information from prior waves is easier when respondents use the mail mode, we found that questionnaire diversity, difficulty, and length impact attrition. Specifically, we found that when panelists perceived a prior wave's questionnaire as more diverse, the likelihood of their future participation increased. In terms of odds ratios (*OR*), our findings mean that the odds of participating are multiplied by 1.15 for each unit the respondent

**Table 1.** Fixed Effects Logistic Regression on Participation in the Panel.

Independent Variables	Mail	Web
	Coeff. (SE)	Coeff. (SE)
Perception of last survey		
Interesting	0.033 (0.044)	0.056 (0.039)
Diverse	0.138** (0.042)	0.074 (0.038)
Important for science	0.055 (0.038)	0.024 (0.035)
Length	-0.139*** (0.034)	-0.196*** (0.027)
Difficult	-0.092* (0.037)	-0.030 (0.032)
Too personal	-0.058 (0.033)	-0.115*** (0.030)
Log likelihood	-4,347.829	-5,373.764
N (spells)	11,607	15,333
N (respondents)	871	1,060
N (waves)	18	18

Note. Coefficients are logits.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

perceives the questionnaire as more diverse on a 5-point scale. The more difficult the respondents perceived the previous wave's questionnaire, the less likely they were to participate again ( $OR = .91$ ). As a third indicator of how burdensome or enjoyable respondents evaluated a previous questionnaire, we found that if they perceived the questionnaire as longer, they were less likely to participate again ( $OR = .87$ ).

With respect to participation via the web mode, we found two characteristics of the last wave's survey that affected future participation: the length of the questionnaire and whether the questionnaire was deemed to be too personal. Similar to our findings concerning the mail mode, respondents were less likely to participate again if they perceived the questionnaire to be too long ( $OR = .82$ ). Interestingly, our data showed that the higher the respondents evaluated the content of the questionnaire as too personal, the less likely they were to participate again with an  $OR$  of .89.

A comparison of the findings on the mail mode and web mode suggests that respondents draw on different sets of information (mail: length, diversity, and difficulty; web: length and privacy) to make their decisions about whether to continue their participation in a panel survey. However, the length of the previous panel interview seems to be of such importance to respondents that they base their participation on this characteristic, regardless of the survey mode. In addition, the effect of perceiving the questionnaire as too personal had an effect on respondents using the web mode but not for those using the mail mode. This finding further suggests that respondents incorporate mode-specific information into their participation decisions. Overall, our analyses yielded evidence that panel attrition differs with respect to survey modes.<sup>2</sup>

## Conclusion

The present study addressed the research gap on mode differences with respect to which prior experiences with a panel survey affect attrition in subsequent waves. Overall, we found a relationship between respondents' survey experiences in prior interviews and panel attrition. However, drawing on data from 18 waves of a mixed-mode probability-based panel survey, we demonstrated differences between modes regarding which prior survey experiences affected participation in future panel waves. This finding is in line with our theoretical reasoning that interacting with a questionnaire not only visually but also haptically results in a more thorough

processing and memorizing of information that can be used in subsequent decisions regarding survey participation. Although the findings appear to be straightforward, they have implications for survey practice and future research.

First, the present study illustrates that a respondent's experience affects their continued participation in a panel. Thus, we recommend designing surveys to decrease the (perceived) burden for respondents, for instance, by shortening the length of questionnaires and providing more diverse content. This finding is particularly important because several prior studies (Behr, Bellgardt, & Rendtel, 2005; Lillard & Panis, 1998; Lugtig, 2014; Lynn, 2009) have identified attrition as a major challenge for panel surveys, and knowledge on the attrition process is still lacking.

Second, our data are in line with the assumption that respondents' visual and haptic interactions with a questionnaire in the mail mode helped them to memorize and assess information regarding questionnaire characteristics and, thus, enabled them to use this information in their decisions about whether to participate again in a panel survey. To our knowledge, prior research has not investigated how respondents process prior survey experiences with respect to different self-administered modes. Accordingly, when predicting attrition with respect to the mail mode, questionnaire diversity and difficulty must be considered. In contrast, respondents' participation via the web mode encouraged them to more strongly consider whether they perceived the questionnaire as too personal. A plausible explanation for the emergence of this effect in the web mode may be the ongoing public debate about data privacy, which is strongly linked to computers and the Internet (Marreiros et al., 2017). An alternative explanation for this finding might be that even the fixed effects regression models we employed were not able to fully account for differences in sample composition between modes due to self-selection (i.e., time-invariant effects of more technology-oriented and privacy-aware respondents who selected the web mode). In both the modes, the perceived questionnaire length was an influential survey characteristic. Our findings suggest that when predicting panel attrition, researchers should acknowledge mode-specific mechanisms, for instance, by using separate models for each mode or by including interaction effects. We see merit in extending our analysis to test for additional modes, such as telephone and face-to-face interviewing; in investigating the role of varying times between waves; and in replicating our analysis to gather more generalizable knowledge. With regard to the latter, we tried to control for unobserved heterogeneity—and thus, mode-selection effects—by using fixed effects regression (Allison, 2009). Replicating our analysis with an experimental design may provide some additional insights, especially with respect to the effect of privacy concerns that only affected participation decision-making with respect to the web mode. However, creating an experimental data set with a comparable number of waves and respondents would be rather laborious and expensive.

Third, survey experience is at least partially under a researcher's control, so the perceived survey burden can be modified by changing the questionnaire length, difficulty, and diversity. Furthermore, tailored information can be provided to address concerns regarding privacy and a survey's importance for science/society. However, changing the response burden may often be a trade-off in research projects, for example, reducing the length of a questionnaire means reducing the number of questions. In this regard, the budding discussions on split questionnaire designs (Peytchev & Peytcheva, 2017; Raghunathan & Grizzle, 1995) could provide valuable insights into how to reduce the questionnaire burden without discarding too much information. Furthermore, considering factors that are modifiable and that affect attrition enables the implementation of responsive and adaptive designs for panel surveys. These designs may be used to balance response propensities in latter waves of a panel to reduce the risk of attrition bias (Schouten, Cobben, Lundquist, & Wagner, 2016). For instance, adaptive designs may be applied to increase the likelihood of respondents with a high risk of attrition to stay in a panel by providing them a better survey experience (e.g., targeted incentives, targeted questionnaire lengths, and selecting preferred and diverse question topics).

## Appendix A

Figure A1 shows the question battery on survey experience as the respondents of the GESIS panel saw it in the mail and web modes. An English translation by the authors of the present study is provided.

Zum Schluss interessiert uns noch, wie Sie diese Befragung empfunden haben.

### (49) Wie war der Fragebogen?

	überhaupt nicht	eher nicht	teils/teils	eher	sehr
Interessant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Abwechslungsreich	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wichtig für die Wissenschaft	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lang	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Schwierig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Zu persönlich	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Figure A1.** Question battery on survey experience.

Finally, we are interested in how you experienced this survey.

How was the questionnaire?

Interesting

Diverse

Important for Science

Difficult

Too personal

(fully labeled 5-point scale: “not at all” to “very”)

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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### Data Availability

The data used in our study are archived in the German Data Archive for the Social Sciences at the GESIS—Leibniz Institute for the Social Sciences (<http://www.gesis.org/dbk>). All analyses were conducted based on release v19.0.0 of study number ZA5665.

### Software Information

All analyses in the present study were done using Stata version 15.1.

### Notes

1. For details about the Understanding America Study, see <https://uasdata.usc.edu/index.php>.
2. To test the robustness of our findings, we fitted additional panel regression models following the hybrid approach suggested by Allison (2009). This approach enables the inclusion of both time-invariant predictors and time-variant predictors in the model. However, when using this method, not all predictors included in the



regression are corrected for time-invariant unobserved heterogeneity. When fitting the models for our robustness check, we included stable sociodemographic variables (i.e., age, gender, education) to control for composition effects in the mail and web modes. Both the regression models fitted by using the hybrid approach were in line with the findings from our fixed effects regressions. With respect to the web mode, we found significant effects for the perception that the questionnaire was too long and too personal. Similarly, regarding the mail mode, we replicated effects for a questionnaire's perceived diversity, length, and difficulty. We also found a significant effect for the perception that a questionnaire was too personal in the mail mode, although we caution against overinterpreting this finding, since the models used in the robustness checks can be considered as less methodologically rigorous compared with the fixed effects regressions. Overall, we interpret the robustness checks as supporting our analyses.

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