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Increasing web survey response rates in innovation research: An experimental study of static and dynamic contact design features

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ABSTRACT

Web surveys have become increasingly central to innovation research but often suffer from low response rates. Based on a cost–benefits framework and the explicit consideration of heterogeneity across respondents, we consider the effects of key contact design features such as personalization, incentives, and the exact timing of survey contacts on web survey response rates. We also consider the benefits of a "dynamic strategy", i.e., the approach to change features of survey contacts over the survey life cycle. We explore these effects experimentally using a career survey sent to over 24,000 junior scientists and engineers. The results show that personalization increases the odds of responding by as much as 48%, while lottery incentives with a high payoff and a low chance of winning increase the odds of responding by 30%. Furthermore, changing the wording of reminders over the survey life cycle increases the odds of a response by over 30%, while changes in contact timing (day of the week or hour of the day) did not have significant benefits. Improvements in response rates did not come at the expense of lower data quality. Our results provide novel insights into web survey response behavior and suggest useful tools for innovation researchers seeking to increase survey participation.

1. Introduction

Scholars of science and innovation increasingly employ survey data from individual scientists and engineers as well as from administrators and managers. Although many of the early and most influential surveys were conducted by national agencies such as the National Science Foundation in the United States or various national statistical offices in Europe,[1] there has been a sharp increase in the number of independent survey efforts, especially online surveys. For example, in the past twelve months there have been more than twenty articles published in *Research Policy* that employ survey data, nearly half of which were administered online.[2] Part of the reason behind the growing trend toward online surveys is that they can be conducted at relatively low cost and within a shorter time frame than conventional paper-based or telephone surveys. In addition, it has become quite easy to obtain email contact information for large samples of scientists and engineers by extracting such information from publications, patents, résumés, university websites or similar sources (cf. Bruneel et al., 2010; Fini et al., 2010; Haeussler, 2011).

Despite the important role of surveys in innovation studies, relatively little attention is given to the challenges of achieving high response rates. Survey participation is a particularly acute issue for web surveys, which tend to suffer from lower response rates than other survey modes, especially as low survey costs lead to "oversurveying" (cf. Couper, 2000; Fricker et al., 2005; Kaplowitz et al., 2004; Rogelberg & Stanton, 2007). For example, while short and direct surveys involving phone follow-ups can achieve relatively high response rates of 40–70% (Brostrom, 2010; Van Looy et al., 2011), more detailed online surveys often exhibit lower response rates of around 10–25%. Low response rates, in turn, reduce sample size and statistical power. Moreover, low response rates may also lead to nonresponse bias and affect the validity of survey results irrespective of the sample size. As a consequence, there is a need to better understand web survey response behavior and to develop techniques to increase web survey response rates.

We contribute to the study of innovation by examining how contact design features such as personalization, incentives, and the timing of survey invitations affect response rates among scientists and engineers and by deriving recommendations for survey

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[1] For example, the Scientists and Engineers Statistical Data System (SESTAT) is based on individual-level surveys managed by the National Science Foundation, and the Community Innovation Survey (CIS) is an integrated firm-level survey effort of European statistical offices.

[2] We searched each issue of Research Policy from June 2010 through May 2011. We identified a total of twenty-four articles that employed survey data, of which ten were postal mail, seven were online, and the remaining seven did not specify the survey mode. Seven of these twenty-four articles used national surveys such as the Community Innovation Survey, while seventeen were "independent" surveys.

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researchers. We first review prior work on the drivers of response rates and present a generalized cost–benefits framework that incorporates heterogeneity across respondents. We then examine the effectiveness of various contact design features using a sample of over 24,000 scientists and engineers who were invited to respond to a survey on their organizational environment, work activities, and their career choices. To examine causal effects, we randomly assigned potential respondents to 25 experimental conditions that differed systematically with respect to various contact design features.

This study extends prior work on web survey response rates in several ways. First, we consider not only design parameters that were relevant in mail surveys, but also features that reflect new opportunities provided by web surveys such as the exact timing of survey contacts. Second, in addition to design features of survey contacts at any particular point in time ("static design features"), we consider several "dynamic design features" that capture aspects of the survey strategy over time including the number of reminders, the delay between reminders, and changes in design features over the survey life cycle. Finally, much of the prior literature on survey response rates has used household or general population samples. It is not clear whether the resulting insights generalize to scientists and engineers, who may differ from the general population with respect to characteristics such as their interest in research, internet use, or work schedules. Thus, our findings based on a sample of scientists and engineers should be particularly relevant for survey researchers working in the areas of science and innovation.

Our results suggest several design features that significantly increase response rates, but we also show that other features have little to no impact on response rates. As such, our results provide novel insights into web survey response behavior of scientists and engineers and provide survey researchers with guidance regarding where to focus their survey design efforts. In addition, this paper may also be of interest to readers of web survey based studies who seek more background on this important and increasingly utilized methodology.

2. Conceptual framework

2.1. The importance of response rates in survey studies

Survey researchers should seek high response rates for several reasons (Couper and Miller, 2008; Dillman et al., 2009; Simsek and Veiga, 2001). First, for a given initial sample size, a higher response rate will translate into a larger number of responses that can be used for statistical analyses. A higher number of cases, in turn, increases statistical power and the researcher's ability to detect significant relationships among measures of interest (Cohen, 1992). Moreover, a larger number of cases may allow researchers to conduct empirical analyses for different subsets of the population, providing insights into moderating effects and heterogeneity. Examples for such a more nuanced analysis include recent work on industry–academia interactions and academic entrepreneurship (e.g., Ding and Choi, 2011; Haeussler and Colyvas, 2011; Sauermann et al., 2012). Small samples, on the other hand, may not only limit the econometric techniques that can be applied to the data but may also affect the credibility of research results in the eyes of reviewers and readers (Rogelberg and Stanton, 2007). Finally, higher response rates are an important way to increase the representativeness of the sample and to decrease nonresponse bias. As such, survey data with high response rates will typically provide more accurate insights into the underlying population (cf. Rogelberg and Stanton, 2007; Wagner, 2008). At the same time, researchers should be aware that nonresponse bias may not be reduced or may even increase if higher response rates are achieved by using contact design features that attract only particular types of individuals (Groves et al., 2006; Groves and Peytcheva, 2008). Therefore, it is important to understand the effectiveness of design features in increasing response rates while also considering the degree to which they may selectively attract certain types of respondents.

2.2. A generalized cost–benefits approach and heterogeneity across respondents

To discuss the effectiveness of various contact design features, we consider a general cost–benefits framework, where the costs and benefits of survey participation (from the respondent's perspective) include economic as well as non-economic factors (Dillman et al., 2009). Benefits of survey participation may include any financial incentives offered by the researcher, individuals' satisfaction of curiosity regarding the survey topic, the feeling to contribute to research, or a sense of reward from helping others. On the other hand, costs of participation involve factors such as time spent answering the survey questions, discomfort from having to think about difficult questions, and potential risks regarding the disclosure of confidential data (Anderson, 2003; Dillman et al., 2009; Groves et al., 2006; Porter, 2004).[3] The various design features of a survey invitation may affect the perceived costs and benefits of responding and thus recipients' decisions to participate in the survey.

Prior research has focused on how contact design characteristics affect average response rates and has not typically considered heterogeneity across individuals. However, it is likely that recipients differ with respect to the costs and benefits implied by a particular survey attribute. For example, some individuals may face high opportunity cost of responding when approached on Mondays while others may face particularly high costs on Tuesdays. Survey researchers may be able to exploit such heterogeneity through a "dynamic strategy" that varies design features over the survey life cycle, e.g., between the initial contact and subsequent reminders. Such a dynamic strategy essentially attempts to appeal to different segments of the survey population in each round and exploits the fact that only one response is needed from each person.

In the following conceptual part of this article, we draw on considerations of costs and benefits as well as heterogeneity across individuals to discuss potential effects of static as well as dynamic survey contact features on response rates. We include in our discussion features that have received considerable attention in the context of mail surveys as well as factors that may represent new opportunities in the particular context of online surveys.

2.3. Static design features

2.3.1. Personalization

Survey researchers can approach potential respondents using some general salutation such as "Dear colleague" but can also

[3] We focus on the costs of responding from the respondent's perspective and do not provide an explicit discussion of the costs of conducting the survey from the researcher's perspective. The overall costs of conducting web surveys tend to be quite low and, except for incentives, none of the design features discussed in this paper should significantly affect those costs. The survey literature provides extensive discussions of survey costs, especially in the context of person-to-person interviews and of mail surveys (Cobanoglu et al., 2001; Dillman et al., 2009; Shannon and Bradshaw, 2002). An interesting recent development is the idea to minimize costs by conducting surveys in multiple phases and to modify the survey strategy in response to observed response patterns over time ("responsive design") (Groves and Heeringa, 2006; Wagner, 2008).