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Original article

On the influence of a raffle upon responses to an urban transportation survey in New York City

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Abstract

Objectives: Determine whether raffling off prizes to increase participation in surveys triggers multiple responses from the same participants.

Methods: All staff, instructors, and students of Queens College, New York, were invited to a 5 minute online survey about commuting in winter 2007. Entry in the raffle to win one of two iPODs was not conditional upon survey completion.

Results: Participation was 18.7 %, and 3913 eligible responses. Of the 183 (4.7 %) participants with two answers, responses were consistent, with weighted kappas ranging between 0.48 and 1.00, and Pearson r's between 0.81 and 1.0. Kappa's were lower for opinion than for factual questions. The duplicate responses came from people with characteristics similar to the full sample. Commute modes included car (46 %), bus but no subway (28 %), and bus and subway (21 %). The median commute time was 90 minutes round-trip, and was greater than 120 minutes for 1/4 of the respondents.

Conclusion: Participation was low despite the raffle. The small percentage of duplicate answers, maybe prompted by the reminding emails, had a negligible impact on the results.

Keywords: Survey – Transportation – Response – Bias.

It is well known that monetary incentives, short questionnaires, personalized presentations, pre-contacts and follow-ups, and salience are factors susceptible to increased response rates to *mailed* questionnaires.[1] Data on *emailed* questionnaires also indicate that the number of pre-notification contacts, personalized contacts, and survey topic salience positively influence response rates.[2,3] These survey boosting tools are important because response rates of e-mail surveys, at least in the United States, have decreased from 46 % for the 1995/6 period to 31 % for the 1998/9 period.[2] In Cook's[3] meta-analysis, the mean response rate for the 68 surveys published was 39.6 %.

Lotteries and raffles belong to the set of potential survey response boosters, yet their impact has been barely studied both for mailed and emailed surveys. The few published reports on the impact of raffles and lotteries on participation in public health surveys are contradictory. In 1981 Mortagy got the same (high) response (68.1 %) for a mailed questionnaire about respiratory symptoms sent to an general English population sample, whether a raffle for money prizes was offered or not.[4] In Australia, Robertson et al[5] found that more general practitioners answered a mailed questionnaire when receiving a scratch lottery ticket (49.7 %) vs. not (40.1 %). In Hong Kong, Leung et al[6], also surveying doctors, found that entry into a lottery increased the low response from 16.8 % (no incentive group) to 19.4 %, while in the United Kingdom Moses and Clark[7] got a high response of 64 % to a postal survey among obstetricians and gynecologists entered in a prize raffle for a personal digital assistant. This was not different, however, from the 62 % participation of those who were not entered in the prize draw.

We chose to raffle IPods to stimulate the participation to an online survey with email invitations conducted at Queens College (QC), one of the City University of New York campuses. The survey analysis revealed an unexpected phenomenon that the literature never mentions, that is, lotteries and raffles can generate multiple answers by the same participants, who most likely wish to increase their probability of winning. The characteristics of our survey provided an opportunity to quantify the magnitude of this phenomenon and its potential impact on the survey results.

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The survey was about modes of commuting to and from QC. The campus hosts about 18,000 students, 200 staff members and 1,300 faculties, but is an island within the subway network of the City of New York. The closest subway stations are two to four miles away from the campus, and all subway commuters must transfer by bus to reach the college. These bus routes are often congested and stop frequently, adding a minimum of 20 to 30 minutes to the commute. The poor public transportation network of QC may be an incentive to commute by car. The objective of the survey was to document the transportation habits and provide some baseline data to assess the impact of intervention aimed at reducing car dependence.

Methods

Four mass emails were sent to all staff, instructors, and students of Queens College between December 17th, 2007 and March 31st, 2008 ("12/17/2007", "1/29/2008", "2/19/2008", and "3/5/2008"). Participation in the survey was voluntary. Every participant submitting an email address was entered in the raffle to win one of the two iPODs.

The online-accessible survey consisted of 16 questions (available from the authors upon request) and took approximately 5 minutes to complete. In addition to age, gender, status at the college, and class year (for students only), questions covered zip code, county name, mode(s) of commute, and duration of commute. The survey also asked the respondents what they considered to be the single most important priority in improving the commute to and from QC. Answers to this question included a subway line, more parking spaces, and 5 possible Bus Rapid Transit options from the nearest subway stations.

The Queens College Institutional Review Board, which authorized the survey, requested that all who approached the survey should be able to enter the raffle, and not just those who completed the survey. In order to protect the anonymity of the responses, the lists of emails and the datasets were kept as separate files with a common identification variable. An anonymous list of duplicate answers was obtained from the email database and merged to the response database.

The analysis is based on simple descriptive statistics. The box limits of the box plots provide 25 and 75 percent of the distribution, the horizontal line in the box is the median, and the whiskers extend to the percentiles 2.5 and 97.5. We also assessed consistency between duplicate answers originating from the same email address, using Pearson r's for continuous variables, and weighted kappa, as a measure of concordance between categorical variables.

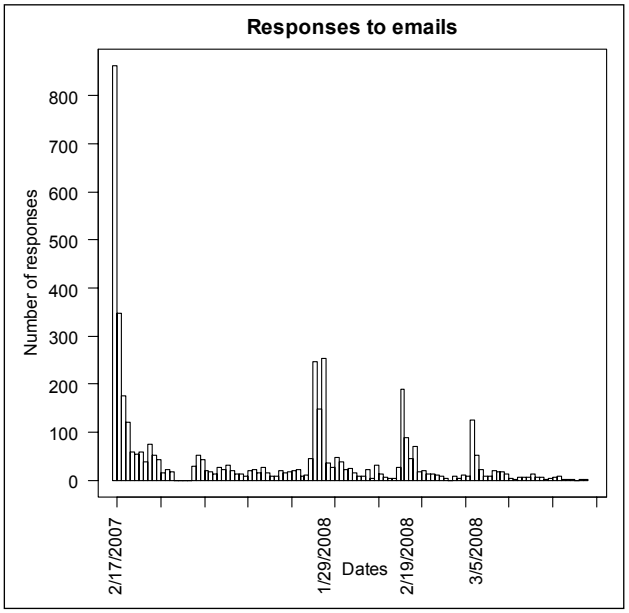

Figure 1. Chronologic evolution of the frequency of survey responses. Dates correspond to the four campus-wide mailings. Queens College, New York, December 2007- March 2008.

Results

Of the 20,948 eligible people, 3,913 responded at least once, 3268 of which were students (83.5 %), 280 of which were instructors (7.1 %) and 365 of which were staff members (9.3 %). Overall, the participation percentage was 18.7 %: 17.8 % for students, 21.2 % for instructors, and 29.8 % for staff. There were 223 duplicate answers corresponding to the same email. 40 of these respondents did not answer the questionnaire the second time they entered their email. In addition, 141 people gave their email to participate in the raffle but did not fill out the questionnaire.

Figure 1 shows the number of daily responses during the three months of the survey. The repeated emails prompted more responses, with the rate decreasing over time.

Of the respondents, keeping only the first answer in case of duplicates, 65 % were women, 46 % commuted by car, 21 % commuted by subway combined with other modes, 27 % commuted by bus (but not subway), 4 % walked, and less than 1 % biked. In Figure 2, box plots indicate similar distributions of commute times in both directions. The median one-way commute time was 45 minutes, with 60 minutes corresponding to percentile 75. Figure 3 presents the box plots of the commute time to QC stratified by college status. Instructors had the longest commutes and staff members had the shortest commute time. Median times of commute to QC were 65, 50, 30, 20 and 15 minutes for subway, bus, car, walk and bike, respectively.

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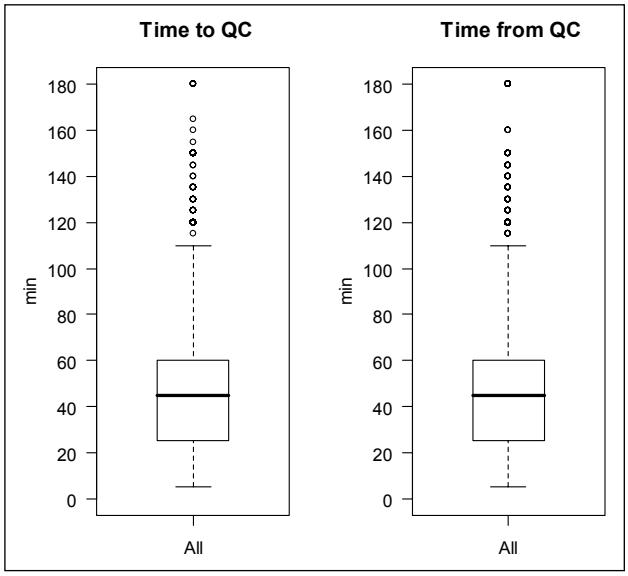

Figure 2. Box plots of the commute time to and from Queens College, for the whole sample without duplicates (n = 3913). Queens College, New York, December 2007- March 2008.

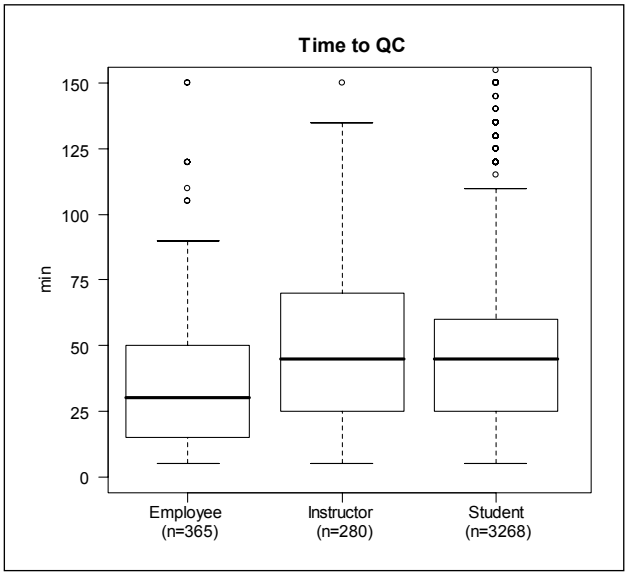

Figure 3. Box plots of the commute time to Queens College, stratified by college status for the whole sample without duplicates. Queens College, New York, December 2007- March 2008.

When asked what could be the most major improvement to the QC transportation system, 37 % chose more parking spaces, but the other two-thirds were split between a direct subway or light rail line to QC (25 %), and the possibility of Bus Rapid Transit systems from the four subway and one train stations near the campus. Instructors preferred a subway line (50 %) over more parking spots (20.1 %).

There were 183 subjects with duplicate questionnaires, two-thirds of which had answered all of the questions twice. Using all of the complete pairs for each item, with a varying number of missing values across items, we found Pearson r as 1.00 for age, 0.99 for the zip codes of origin, 0.94 for the zip codes of destination, 0.81 for the commute time to QC, and 0.84 for the commute time from QC. The weighted kappa was 1.00 for gender, 0.94 and 0.93 for the commute mode from and to QC respectively, and 0.89 for college status. However, reproducibility was much lower on opinion questions: kappa was 0.55 for whether or not they were interested in receiving the survey results, 0.48 for the question about the most major improvement to the QC commute, and 0.49 for whether or not they would be interested in participating in research projects related to transportation.

Of the duplicate respondents, 66.0 % were women, 75.8 % were students, 13.3 % were instructors, and 10.9 % were staff members. 44.3 % commuted by car, 18.1 % by subway combined with other modes, 29.5 % by bus (but not subway), 1.9 % walked, and less than 2 % biked. Median commute time to QC was 45 minutes, and for 75 % was 60 minutes. The characteristics of the duplicate respondents were therefore almost identical to those of the full sample.

Discussion

There are several lessons one can draw from this experience. The first is that surveys involving a raffle or multiple prompts should expect multiple entries from the same people. The second is that the amount of duplicate answers may not be huge. In our case it was 5 %. The third lesson is that, in case of multiple responses, participants are more likely to complete the full questionnaire the first time they access it. Finally, for investigators who are not able to identify duplicates: their impact on the survey results is likely to be negligible because multiple responders do not appear different than the other participants on gender, College status or commuting modes.

Even though we cannot estimate what would have happened without the raffle, it did not boost the participation even to the average levels of response rates to email questionnaires in the US, that is, about 40 %.[2,3] The most recent surveys reviewed by Sheehan[2] were performed in 2000 and had 24 % participation, which is higher than our overall rate but similar to the participation of the instructors and staff.

About 5 % of the participants provided duplicate answers. The reason why these people participated to the survey twice cannot be established with certainty. The iPOD raffle may have been an incentive. Answering several times would have increased the chances of winning had we not removed the duplicates before selecting the winners. However, inclusion in the raffle was not dependent on completion of the questionnaire. There was no reason for the intentionally duplicators to answer the questionnaire again. A more convincing explanation

is that some people answered the questionnaire each time they were prompted, not remembering they had already answered it. The fact that the second response was often left incomplete may suggest that some respondents realized after they had started that they had already participated and therefore interrupted the survey before finishing. The reminder emails explicitly warned those who had already participated not to do it again, but it may not have been explicit enough. We cannot rule out either that, because some participants attempted to increase the weight of their personal preference in terms of transportation policy for the college. Overall, duplicates may be more linked to the number of reminders than with the raffle itself. Thus, the number of follow-up contacts, which in our survey was unusually high,[2] needs to be evaluated against the risk of duplicate responses.

The survey shows that half of the QC people who responded spend more than an hour and a half per day commuting, and a quarter spends more than two hours. A direct subway line would cut 20–30 minutes of their subway commuting time, decreasing it to a more decent median of 35 to 45 minutes one way for subway riders who currently have the longest commute time. The reproducibility analysis on the duplicate answers indicate that the data on age, gender, college status, commute mode, and duration of commute was very reliable, more so than questions querying their opinions, such as the greatest priority in improving the college transportation network. These data have provided a basis for discussions with the Metropolitan Transit Authority and the Department of Transportation of New York City, as well as campus wide debates.

Greater use of public transportation by commuters would reduce the college's contribution to traffic, air pollution, and the overall carbon footprint of New York City. Promoting public transportation can also improve the health of the college community, since public transportation users walk and climb stairs more than car commuters do.[8–11]

Summary in Chinese

研究目的：使用抽奖法是否能导致相同研究对象对同一问卷调查重复参与

研究方法：研究者于2007年冬季邀请纽约城市大学皇后学院所有教职工和学生参与一个长约5分钟的关于上下班交通的网上问卷调查。无论是否完成问卷调查，参与者都有机会赢取研究者提供的两个iPODs中的一个。

研究结果：3913个研究对象，相当于18. 7%符合条件的研究对象参与了调查。其中183个研究对象(占4.7 %)重复参与相同的问卷调查。他们的回答基本一致：加权kappas在0.48到1.00之间； Pearson相关系数在0.81到1.00 之间，但对征询观点的回答其Pearson相关系数较之对询问事实回答的低。那些重复参与相同问卷调查的研究对象其总体特征和全体研究对象相似。问卷调查的上下班交通包括自己驾车 (46 %) ，乘坐公共汽车但非地铁(28 %)，使用公共汽车和地铁 (21 %)。上下班通勤时间的中位数是双程90分钟。但在四分之一的问卷调查的参与者中，上下班通勤时间的中位数超过120分钟。

研究结论：尽管研究者提供了抽奖的刺激，问卷调查的参与率依然较低。提醒邮件可能促使研究对象对相同问卷重复参与，但比率不高，对研究结果几乎没有影响。

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