Representativeness versus response rate:

It ain't the response rate!¹

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¹During the 1992 U.S. Presidential election, the Clinton campaign "War Room" continually and prominently displayed the mantra, "It's the economy, stupid!". This display was intended to remind everyone, including both campaign workers and the candidate himself, of the overarching importance of this preeminent message.

During the 1992 U.S. Presidential election, the Clinton campaign "War Room" continually and prominently displayed the mantra, "It's the economy, stupid!". This display was intended to remind everyone, including both campaign workers and the candidate himself, of the overarching importance of this preeminent message. Mantras are also useful in other lines of work, such as survey research.

When we do survey research we frequently use samples from the population of interest, because the expense of surveying everyone is prohibitive, or, more importantly in an Internet web-based survey era where cost is not much of a consideration, because we think we can obtain a representative view of perceptions without inconveniencing all the people in our target population. Thus, election polls are conducted with only an infinitesimal proportion of the population, such as 0.000013 of the total population (e.g., 2,000 / 150,000,000) of registered voters.

Of course, when we sample from the population, it is critical that our sample is representative, if we want our characterization of population perceptions to be accurate. A powerful mechanism for obtaining representative samples is random sampling.

Even laypersons not trained in statistics have at least an impressionistic understanding of the power of random sampling. They see it in election polls. And they see this power portrayed even in the popular press. For example, the recent New York Times obituary of prominent statistician John Tukey (who coined the word, "software") acknowledged the power of random samples. The obituary
noted that Tukey's

...first brush with publicity came in 1950, when the National Research Council appointed him to a committee to evaluate the Kinsey Report, which shocked many Americans by describing the country's sexual habits as far more diverse than had been thought... In a series of meetings over two years, Mr. Kinsey vigorously defended his work, which Mr. Tukey believed was seriously flawed, relying on a sample of people who knew each other. Mr. Tukey said a random selection of three people would have been better than a group of 300 chosen by Mr. Kinsey. (Leonhardt, 2000, p. A19)

The problem with using random samples in survey research, however, is that not everyone randomly invited to participate actually completes the survey. Thus, Kerlinger (1986) noted years ago regarding mailed surveys that response rates "are generally poor. Returns of less than 40 or 50 percent are common. Higher percentages are rare" (p. 380). A recent meta-analytic review of response rates in web-based surveys suggests that similar response rate issues can arise in this medium also (Cook, Heath & R.L. Thompson, 2000).

Statement of the Problem

The web-based survey of perceptions of library quality, "LibQUAL+", has been described in some detail elsewhere (cf. Cook & Heath, 2000a; Cook, Heath & B. Thompson, 2000a; Cook, Heath, B. Thompson & R.L. Thompson, in press). The origins (Cook & Heath, 2000) and the score psychometric properties of LibQUAL+ have also been described in detail (Arnau, R.L. Thompson & Cook, in press; Cook & Heath, 2000b; Cook, Heath & B. Thompson, 2000b; Cook, Heath,
LibQUAL+ was piloted in the Spring, 2000. Valid responses were obtained from 4407 respondents, which represented a response rate of roughly 14.4%. Clearly, large numbers of randomly selected participants did not complete the survey.

The question is, were these 4407 respondents still representative of the populations from which they were drawn? Clearly, if pollsters can generalize from 600 or 200 respondents to 150 million, size doesn't matter much--but representativeness is critical. Cook, Heath and R.L. Thompson (2000) noted, for example, that "in 1936... Literary Digest polled a million homes and erroneously predicted Landon's defeat of Roosevelt--another example that sample representativeness is more important than sample size."

Size only matters in the sense that if all members of a population or of a random sample respond, then we are sure of representativeness. But 100% response rates are very unlikely in survey research. Indeed, in their meta-analysis Cook, Heath and R.L. Thompson (2000) reported that the mean response rate for 68 web-based surveys was 39.6%, and that response rates were also highly variable (SD = 19.6%).

The present paper was written to illustrate some post hoc analyses that can be conducted to evaluate the potential response bias that may occur when some randomly drawn participants decline to participate in surveys. Specifically, the analyses were conducted to address two questions.

First, are response rates higher when larger percentages of
Representativeness populations are randomly sampled? Logically, if the random samples drawn at different campuses are representative of their different campus populations, response percentage rates should not be appreciably affected by drawing proportionately larger samples. However, campuses in which response percentages and sampling percentages do not match may reveal intriguing dynamics within a given campus.

Second, do the respondents at different campuses have profiles matching those of the campus populations? If the profiles match, then it may seem more reasonable to presume that the sample remains representative of the populations as regards perceptions of library quality even when response rates are lower. Of course, more confidence might be vested in such conclusions as a function of more sample-profiles-to-population-profiles comparisons having been made.

Results

Response Percentages Related to Sampling Percentages

Table 1 presents by campus the percentages sampled and the response rate percentages for all users sampled. The table also presents the same two percentages by campus as regards three (i.e., undergraduate students, graduate students, and faculty) of the several respondents' roles.

INSERT TABLE 1 ABOUT HERE

Figures 1 through 4 present the scatterplots for these two variables both for the total sample and for three of the respondent


Representativeness -7-
groups. The figures also present the bivariate correlations (i.e., .50, .44, .47, and .52, for undergraduates, graduate students, faculty, and total samples, respectively) between percentages of campus populations sampled and sample composition percentages. And the figures present the regression equations for predicting final sample composition percentages from the initial sampling percentages.

INSERT FIGURES 1 THROUGH 4 ABOUT HERE

Sample Representativeness

Figure 5 presents the sample composition percentages of the undergraduates who responded in comparison by discipline with the average percentages of the undergraduate populations in the disciplines at the various phase one LibQUAL+ campuses. Figure 6 presents the sample composition percentages of the graduate student who responded in comparison by discipline with the average percentages of the graduate student populations in the disciplines at the various phase one LibQUAL+ campuses.

INSERT FIGURES 5 AND 6 ABOUT HERE

Figure 7 presents the sample composition percentages of the undergraduates who responded in comparison by class rank (e.g., freshman, sophomore) with the average percentages of the undergraduate populations in the class ranks at the various phase one LibQUAL+ campuses. Figure 8 presents the sample composition percentages of the graduate students who responded in comparison by
class rank (i.e., masters or doctoral) with the average percentages of the graduate student populations in the class ranks at the various phase one LibQUAL+ campuses. Figure 9 the sample composition percentages of the faculty who responded in comparison by academic rank (e.g., Assistant Professor, Associate Professor) with the average percentages of the faculty populations in the academic ranks at the various phase one LibQUAL+ campuses.

INSERT FIGURES 7 THROUGH 9 ABOUT HERE

Discussion

Krosnick (1999) emphasized in his recent survey of the paper-and-pencil response-rate literature:

But it is not necessarily true that representativeness increases monotonically with increasing response rate... [R]ecent research has shown that surveys with very low response rates can be more accurate than surveys with much higher response rates. (p. 540)

But representativeness ought to be tested, and not simply assumed.

Response Percentages Related to Sampling Percentages

The results presented in Table 1 and Figures 1 through 4 suggest that inviting a larger percentage of respondents to participate in a web-based survey generally results in proportional increases in participation that reflect inviting more people to participate. That is, as was expected the percentages of our final sample of 4407 respondents generally reflected the numbers of
invitations to participate on each campus.

But there were some exceptions to this pattern. For example, as regards undergraduate students 17.9% of the final sample was from Virginia Tech, 12.9% from the University of Washington, and 11.8% from the University of Kansas, even though these three schools provided 10.1%, 7.7%, and 7.7% of the LibQUAL+ invitations to undergraduates to participate. The higher response rate may reflect the more "wired" and technologically-savvy atmosphere at these campuses, and particularly Virginia Tech.

Across the respondent groups the percentages of the final sample who resided at Virginia Tech were uniformly higher in relation to participation invitation proportions than at other campuses. Conversely, the University of California at Santa Barbara issued disproportionately more invitations to participate, but these invitations were disproportionately less likely to result in survey participation.

Sample Representativeness

In general, the percentages of sample composition of our respondents matched those drawn in the corresponding populations. For example, a close match was obtained by faculty ranks, as reflected in Figure 9.

Our final sample tended to be somewhat disproportionately less likely to include:

1. undergraduate students in the Humanities (see Figures 5);
2. undergraduates who were freshman (see Figure 7); and
3. graduate students who were masters-level students (see Figure
Our final sample tended to be somewhat disproportionately more likely to include:

1. undergraduate and graduate students in the Sciences and the Social Sciences (see Figures 5 and 6); and
2. graduate students who were doctoral-level students (see Figure 8).

Lessons Learned

It clearly is important to conduct post hoc respondent bias analyses whenever fewer than 100% of invited respondents participate in a survey. And the more such analyses that can be conducted, the more confident one can be that obtained results are representative.

Advance Profile Collection. One thing that we have learned is that participating institutions should be asked to provide demographic profiles before the survey is administered. This avoids the challenges of securing profile information after the study has been concluded.

Potential versus Real Users. Researchers investigating perceptions of libraries also confront a difficult decision about whom to target for survey participation. These decisions are more clear-cut in election polls. For example, such polls never include unregistered voters, and often also exclude registered but unlikely voters. The rationale for such decisions is clear: pollsters wish to predict the outcomes of elections that are determined solely by registered voters who chose to vote.
But should library quality surveys include participants based on frequency of library usage (e.g., disproportionately many frequent users), only actual users, or all potential users? If nonusers are surveyed, are their perceptions important because these perceptions may illuminate reasons for nonuse? Or do the perceptions of nonusers merely reflect rationalizations for nonuse?

In the LibQUAL+ study we have to date taken the view that the perceptions of ALL potential users are important. In the campus environment all students have paid fees to help defray library expenses, and all faculty presumably have some need for the library if they are to meet their responsibilities to remain current with knowledge in their fields and to create and disseminate knowledge.

But if nonusers are asked to provide perceptions of library quality, we must expect some nonusers to decide rationally that they have no perceptions of the services they have not recently accessed. So when we sample the entire university campus of potential users, we must expect some attrition in response rates associated with our decision to be inclusive in seeking perceptions of library quality, because nonusers are probably disproportionately likely to decline to participate in such surveys.
References


Table 1
Response-Rate Percentages and Survey-Participation-Invitation Percentages Across the Various Phase One LibQUAL+ Campuses

<table>
<thead>
<tr>
<th>School</th>
<th>Undergrads</th>
<th>Grads</th>
<th>Faculty</th>
<th>Everyone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Respond</td>
<td>Sent</td>
<td>Respond</td>
<td>Sent</td>
</tr>
<tr>
<td>Arizona</td>
<td>5.7%</td>
<td>7.7%</td>
<td>4.6%</td>
<td>7.0%</td>
</tr>
<tr>
<td>U CA SB</td>
<td>7.7%</td>
<td>15.3%</td>
<td>12.1%</td>
<td>14.0%</td>
</tr>
<tr>
<td>U Conn</td>
<td>5.2%</td>
<td>8.1%</td>
<td>6.0%</td>
<td>7.4%</td>
</tr>
<tr>
<td>Houston</td>
<td>4.5%</td>
<td>7.7%</td>
<td>9.4%</td>
<td>7.0%</td>
</tr>
<tr>
<td>Kansas</td>
<td>11.8%</td>
<td>7.7%</td>
<td>8.0%</td>
<td>5.8%</td>
</tr>
<tr>
<td>MI State</td>
<td>6.1%</td>
<td>7.7%</td>
<td>6.7%</td>
<td>7.0%</td>
</tr>
<tr>
<td>U Minn</td>
<td>5.2%</td>
<td>5.1%</td>
<td>6.3%</td>
<td>7.0%</td>
</tr>
<tr>
<td>Penn</td>
<td>9.6%</td>
<td>7.7%</td>
<td>5.1%</td>
<td>7.0%</td>
</tr>
<tr>
<td>U Pitt</td>
<td>7.2%</td>
<td>7.7%</td>
<td>6.1%</td>
<td>7.0%</td>
</tr>
<tr>
<td>TAMU MSL</td>
<td>0.0%</td>
<td>0.0%</td>
<td>3.9%</td>
<td>8.6%</td>
</tr>
<tr>
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<td>17.9%</td>
<td>10.1%</td>
<td>16.2%</td>
<td>8.4%</td>
</tr>
<tr>
<td>U Wash</td>
<td>12.9%</td>
<td>7.7%</td>
<td>9.2%</td>
<td>7.0%</td>
</tr>
<tr>
<td>York</td>
<td>6.2%</td>
<td>7.7%</td>
<td>6.5%</td>
<td>7.0%</td>
</tr>
</tbody>
</table>
Figure 1.

Undergraduate Student Response Percentage Predicted by Percentage Sent

Note. $r = .50$; $\hat{Y}_i = 2.39 + .69 \ (X_i)$.
Figure 2.

Graduate Student Response Percentage Predicted by Percentage Sent

Note. $r = .44$; $\hat{Y}_i = 2.06 + .73 (X_i)$. 
Figure 3.

Faculty Response Percentage Predicted by Percentage Sent

Note. $r = .47; \hat{Y} = -1.82 + 1.23 \left( X \right)$. 
Figure 4.
Total Response Percentage Predicted by Percentage Sent

*Note.* $r = .52; \hat{Y}_i = 2.18 + .72 \text{ (X}_i\text{).}$