

An On-Line Survey of Food and Beverage Consumers on the Internet: An Evaluation of the Survey Methodology

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Researchers at the University of Maine conducted an on-line consumer survey of twelve selected WWW sites marketing coffee, salsa, and seafood products in June and July, 1996. This survey targeted Internet users interested in WWW food or drink sites, food- or drink-related newsgroups and mailing lists, electronic magazines, or searching for food or drink topics on Internet browsers to take part in the survey. All aspects of the survey were conducted via the Internet. This paper describes the process used to administer that survey and evaluates the results with respect to effectiveness of the on-line survey technique and the potential for biases which could result from the technique. The technique was found to be useful and reliable with no apparent biases resulting from the order in which companies were evaluated, allowing reviewers to complete more than one set of company evaluations, or allowing respondents to complete the survey in multiple sessions during the survey period. Self-selection continues to be a concern in on-line surveying since there is no method for selecting a truly random sample, but the population included in this project was reasonably consistent with those characterized in other on-line and telephone surveys of Internet use. This paper also describes a variety of benefits of on-line surveys including an apparent entertainment value to respondents, response time, and low administrative costs.

Keywords: On-line surveys, Internet, survey research

Introduction

The Internet has provided businesses with a new technology to market their products to an estimated population of over 18 million users. (Nielson 1995) It has developed so rapidly and in such an atmosphere of high expectations that many business decision makers have found it difficult to know how the technology could most effectively contribute to their overall marketing strategy and how to best design their World Wide Web (WWW) site.

Research by the Graphic, Visualization & Usability Center (GVU) of the Georgia Tech Research Corporation (Pitkow 1996) has regularly surveyed the general Internet user population to establish demographic trends and usage characteristics. They found that the average Internet user is young, educated, and male with an average personal income of \$59,000. They have also documented that approximately 14% of population use the Internet for shopping purposes. Their work includes basic data on Internet food and beverage purchasing activity, but it is of limited use to food and drink businesses interested in reaching those Internet users most likely to purchase their products.

The University of Maine began conducting a research program on the on-line marketing of specialty food and drink products in October, 1995. Surveys have been conducted of both businesses with an electronic marketing presence and the consumers who visit these sites, participate in food newsgroups, or look to on-line food magazines (e-zines) for information. These projects have documented a growth in the number of food and drink firms on-line from approximately 100 in October 1995 to over 600 in March of 1996. (White & Cheng 1996; White 1996) While the most frequently reported marketing goal for companies with an on-line

presence is to increase electronic sales, few firms have yet to see a significant amount of electronic commerce.

A July 1996 survey was conducted to identify factors which influence consumers' willingness to make food and drink purchases from commercial WWW sites. It focused on three areas: the consumers (demographics, previous purchasing activity, and their Internet connections), the products (food and drink category and price), and the WWW sites (transfer speed, ease of navigation, company and product information, graphics, order options, and overall appeal). (White 1996) The process of identifying respondents and administering the survey were conducted entirely on-line.

This paper describes the process used to administer the survey and evaluates the results with respect to effectiveness of the on-line survey technique. It also evaluates survey results for potential biases associated with the procedures used.

Survey Overview

Twelve food and drink sites, four each marketing coffee, salsa, or seafood, were included in the study. They were chosen based on their various approaches to ordering options, use of background color or graphics, product photos, links to other sites, and other content factors. Each company agreed not to make substantive changes in its WWW site during the course of the survey.

The survey was prepared as a series of HTML pages on the University of Maine's server and administered from June 20th through July 11th.

Efforts were made to encourage participation by Internet users who had visited food and/or drink sites and those who participate in food- or drink-related newsgroups, mailing lists, or similar activities. Participants came to the survey site from a variety of avenues. To encourage participation in the survey, participants were offered a chance to win one of 100 "Specialty Food and Drink on the Internet" t-shirts.

The first set of participants volunteered by providing their e-mail address on the Spring 1996 Specialty Food and Drink on the Internet demographic study. (Respondents to that survey were directed to the survey site through links from participating specialty food and drink sites, notices in food and drink newsgroups, promotion in several e-zines, and registration with a number of WWW browsers.) One hundred fifty-five (64%) of the respondents to the demographic survey provided an e-mail address and indicated a willingness to be notified in June about the site evaluation study. This group is referred to as "volunteers" in the remainder of this manuscript.

After the demographic survey concluded, the WWW site was changed to an announcement of the forthcoming site evaluation study and a pre-registration survey. This survey collected basic demographic information including gender, age, income, and zip code or country of residence; Internet browser type and modem connection speed; information about purchases within the past six months of the three food products included in this phase of the study; and the respondent's e-mail address. A total of 54 people pre-registered for the project during this time and are referred to as "pre-registers" throughout the remainder of the manuscript.

On June 20th, each “volunteer” and “pre-register” was notified by e-mail of the URL for the starting point of the survey and provided with a group number and identification code to use with each evaluation. “Pre-registers” were sent to an instruction page with links to the group of sites they would be evaluating. “Volunteers” had not yet provided information about their purchasing behavior of the targeted products, and were therefore initially directed to the pre-registration survey and then to the instruction page and their group (see Figure 1).

People who came to the site for the first time after the study began (referred to as “walk-ins”) were also linked to the registration page. Ninety-two people registered while the survey was in progress.

After completing the registration survey, “walk-ins” were directed to a designated group and told to use their initials for an ID. The group to which new registrants were sent was changed daily so that their reviews would be more evenly distributed among the twelve companies.

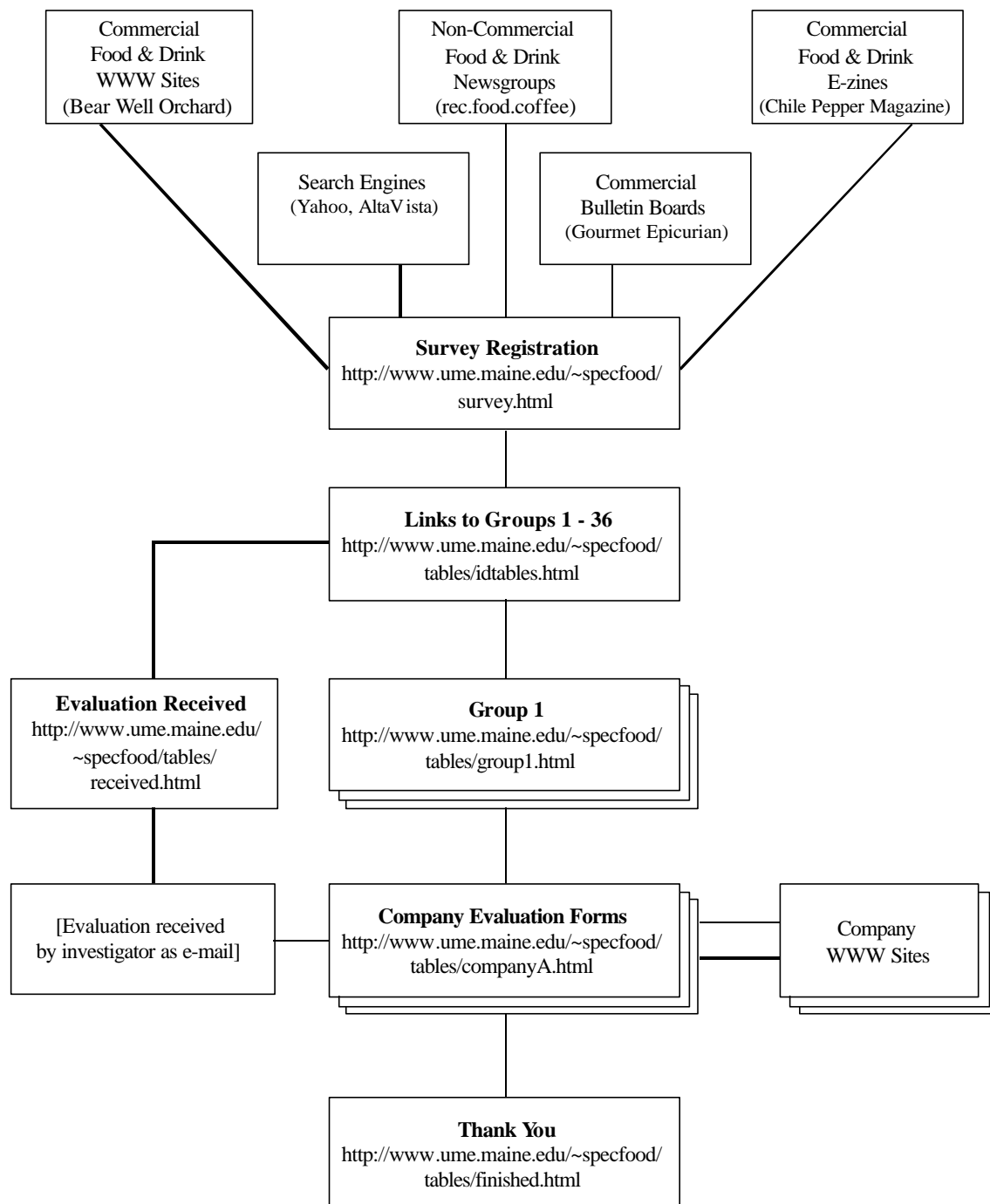
When a reviewer entered the assigned group he/she found links to each of the six companies to be evaluated. It was suggested that the reviewer bookmark the page so that he/she could return to complete the reviews at a future time if necessary. There was no time limit for their reviews of the six sites within the study period. Participants were told to review the sites in the order in which they appeared on the page. The decision to assign only six sites to each participant was somewhat arbitrary, but was based on the fact that many reviewers would be paying for their on-line time.

The 12 companies were distributed among 36 groups. Each group had two companies from each product category. The groups were organized so that each company appeared in the same number of groups as the others and so that each appeared equally first and last on the list of company links.

As a respondent selected each company in the assigned group, he/she was taken to the evaluation page for that firm. Each company’s evaluation page contained a link to the company’s homepage at the top. The first step for reviewers was to explore the company site and then return to the evaluation page. Below the link to the company was a space for the reviewer’s ID and questions about the rating of the site. Respondents were also asked which, if any, of the company’s products they would consider purchasing in the next six months. They were then asked how likely it was that they would actually make a purchase. A table listing all the products offered by the company (and prices) was provided for their convenience. Each of the rating questions also had an associated comment field. There was also a field at the end of the survey form for any additional comments that the reviewer might want to make.

After completing a site evaluation, reviewers submitted the form and returned to the group page to link to the next company’s evaluation. When they had completed all six evaluations, reviewers were directed to a page thanking them for participating. They were also told that if they had enjoyed the process and would like to review another group of sites they could send an e-mail message and another group would be assigned to them.

After 10 days, a second request to participate was sent to all “volunteers” and “pre-registers” who had not yet begun to evaluate sites. Four days before the end of the survey period, a third request to participate was sent to those who had not begun. At this time, a reminder was also sent to everyone who had begun the process but had not completed the six sites in their group.

Figure 1. Flow Diagram of On-line Survey

Respondent Characteristics

At the end of the survey period, 166 individuals had completed 973 site evaluations. Among those who had previously indicated a willingness to participate in the study, 52.9% of the “volunteers” and 51.8% of the “pre-registers” completed at least one site evaluation. Of the 92 walk-ins, 68.4% evaluated at least one site.

Fifty-five percent of respondents were female; forty-five percent were men. The modal response for age among males was 45-54 and for females 35-44. Over 90% of all respondents had an education level beyond high school. The approximate median 1995 household income was \$55,000.

Within the past six months salsa was purchased from retail stores by the largest percentage of the respondents (88.6%), closely followed by seafood (86.1%) and coffee (80.1%). Coffee had been purchased by mail order by the largest percentage of respondents (16.3%), and salsa had the largest number of respondents reporting purchases on-line (4.8%). Men were more likely to have purchased one of the three products on-line within the past six months ($\chi^2 = .01$).

Tests for Respondent Bias

Several potential sources of bias in the survey data which might have resulted from the on-line survey technique were tested. In general these are described as:

- self-selection bias-- due to the fact that all respondents initiated their contact with the project;
- order bias-- the possibility that respondents might rate initial sites differently than those at the end of the series;
- “second set” bias-- if respondents reviewed more than the initial set of six sites, is there a bias with these evaluations such that they should be excluded from the base set of reviews; and
- “multiple session” bias-- are the later reviews of respondents who took multiple sessions to complete their group of sites consistent with their initial evaluations.

Self-selection bias

The issue of sample selection has been a perennial concern in Internet-based survey research, and investigators have taken several approaches. The focus of most of the published studies has been to estimate the demographics of “Internet users.” There are two basic approaches to this goal. GVU and SRI (Stamford Research Institute) have directly sampled active Internet users with on-line surveys. (Pitkow & Kehoe 1995, SRI 1995) Potential respondents are generally notified of the existence of these surveys through links to browsers, notices to newsgroups, press releases, announcements in trade publications, and through mailing lists. The second approach, use of a random telephone dialing procedure, was used by Nielson, O’Reilly, and The American Internet User Survey. (Nielsen 1995; O’Reilly 1995; ETR Group 1995)

While the estimates of the total number of Internet users vary among these reports, there is a great deal of comparability with respect to the basic demographic factors of gender, age, and income (see Table 1). Some of the differences may be due to the rapid growth in the number of Internet users and varying definitions of an Internet user. The three GVU studies show a decreasing trend in income and increasing participation by women. There was a significant drop in the mean age from the Third GVU Study to the Fourth and a moderate increase in the Fifth GVU Study.

The Specialty Food and Drink on the Internet demographic study estimated the characteristics of that portion of the Internet population which is interested in food and drink sites. (White & Cheng 1996) It used an on-line approach, attracting respondents from commercial food and

drink WWW sites, newsgroup postings, announcements in e-zines, and links from browsers. With the exception of gender, these respondents were similar to those found by studies of the general Internet population which used both an on-line approach and random telephone interviews.

The respondents to this survey closely resembled those identified in the previous demographic study. This suggests that this method for attracting survey participants was successful in identifying a representative sample of Internet users interested in food and drink sites. The differences in gender and, to a lesser degree, age between the food and drink respondents and the general Internet population suggest that a larger percentage of female Internet users and older Internet users use the WWW for food and drink information and/or shopping, but this group falls within the “mainstream” Internet population.

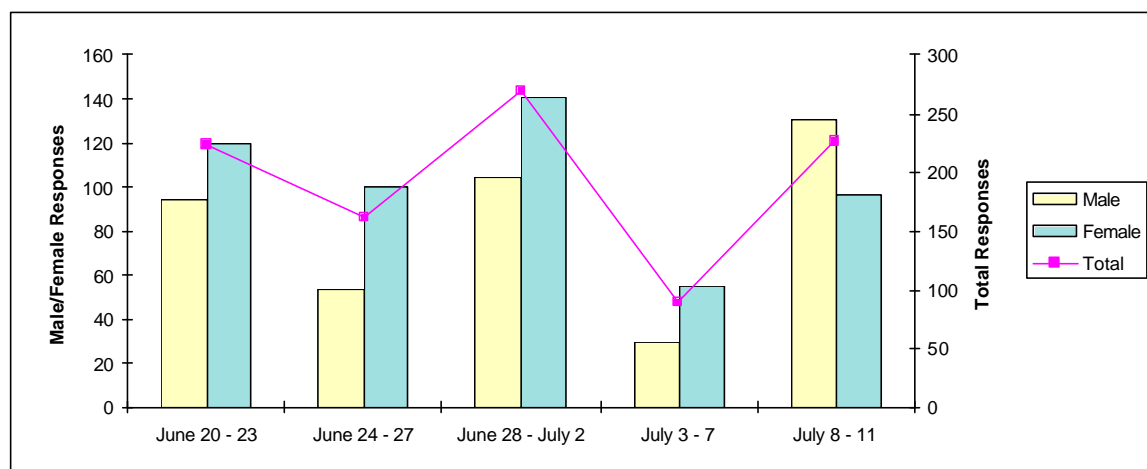
Table 1. Estimates of Gender, Age, and Income of Internet Users as Characterized by Selected Studies

Study	Gender (% Female)	Age (mean)	Income
SRI (Feb 95)	27	30	53,000 (mean) 40,000 (median)
GVU3 (Apr/May 95)	17	36	69,000 (mean) 58,000 (median)
Nielson (Aug/Sept 95)	36	34	
GVU 4 (Oct/Nov 95)	30	31	63,000 (mean) 50,000 - 60,000 (median)
O'Reilly (Oct 95)	33	32	62,000 (mean) 50,000 (median)
SRI (Oct 95)	40	27	
American Internet Survey (Dec 95)	35	36	61,500 (mean)
GVU 5 (Apr/May 96)	31.5	33	59,000 (mean) 50,000 - 60,000 (median)
White and Cheng (Apr/May 96)	52	37 (median)	58,000 (median)
WWW evaluation study	55	38 (median)	55,000 (median)

In addition to comprising a larger portion of the population, women were more likely than men to evaluate at least one company's WWW site (see Table 2). They also responded earlier during the survey period (see Figure 2). The third and final notice which was sent to all respondents who had not completed six company evaluations appears to have been very important in increasing the participation of males in the review process.

Table 2. Number of Company Evaluations Submitted by Gender (%)

Number of Evaluations Submitted	Male	Female	Total
0	47.4	35.8	41.8
1-4	11.3	16.2	13.8
5+	41.4	48.0	44.4

Figure 2. Survey Responses by Date and Gender

There was a concern that allowing some respondents to pre-register for the survey and others to enter the survey during the evaluation period could present another possible bias. It was determined that “walk-ins” were more likely to complete at least one company evaluation (see Table 3), but they were not significantly more likely to complete an entire set.

Company ratings did not vary significantly between respondents who pre-registered and “walk-ins” (see Table 4). It should be noted that both groups were contacted through the same means -- food and drink WWW sites, newsgroups, e-zines, etc.

Table 3. Response Rate by Source of Registration (%)

Source of Registration	Number of Evaluations Submitted		
	0	1 - 4	5 +
Pre-registered*	47.4	10.0	42.6
Evaluation Survey “Walk-Ins”	31.5	21.7	46.7

* Includes “volunteers” and “pre-registers”

Table 4. Distribution of Responses to Five Site Evaluation Questions by Source of the Respondent's Registration (%)

Source of Registration	Site Rating	Overall	Likelihood of purchase on-line	Likelihood of purchase by mail order	Likelihood of purchase from retail outlet	Likelihood of return to on-line site
Pre-registered*	Poor/Fair	15.9	69.5	68.8	33.0	53.6
	Neutral	25.3	10.6	11.1	11.6	13.2
	Good/	58.8	19.9	20.4	55.4	33.2
	Excellent					
Evaluation Survey "Walk-Ins"	Poor/Fair	18.1	65.4	64.6	31.9	50.6
	Neutral	23.4	14.1	14.1	15.6	19.0
	Good/	58.6	20.6	21.3	52.5	30.3
	Excellent					

* Includes "volunteers" and "pre-registers"

Order bias

The survey was structured by organizing the 12 sites into 36 groups of six. Since each site appeared in the first through sixth position in various groups, it was possible to test whether there was a bias due to a site appearing either early or late among the sites reviewed. The hypothesis was tested that a bias existed due to the order of the site in the review group by comparing the responses to five questions for each site based on the order in which the sites were evaluated (see Table 5) The questions were related to the overall rating of the site, the likelihood of purchase of a product on the site within the next six months via on-line, mail order, and from a retail outlet, and the likelihood of returning to the site within the next six months.

Based upon a chi-square test, only "Likelihood of purchase from a retail outlet" exhibited a change in the distribution of responses based on the order in which the site was reviewed ($\chi^2 = .025$). When a site was reviewed later in the process, reviewers stated a lower likelihood of purchasing the product from a retail outlet. The other two questions regarding the likelihood of purchase (i.e., on-line or by mail order) and the overall rating of the site all had chi-squares greater than .90 indicating a very high level of comparability. Why likelihood of purchase at a retail outlet declined with increasing exposure to other food and drink sites is unclear.

Table 5. Distribution of Responses to Five Site Evaluation Questions Based on the Order in which the Site Was Reviewed (%)

Order in which site was reviewed		Overall	Likelihood of purchase on-line	Likelihood of purchase by mail order	Likelihood of purchase from retail outlet	Likelihood of return to on-line site
1 st	Poor/Fair	17.5	71.3	68.1	25.6	54.4
	Neutral	28.9	9.6	12.7	12.2	15.4
	Good/	53.6	19.2	19.3	62.2	30.2
	Excellent					
2 nd	Poor/Fair	15.5	67.8	65.7	27.1	53.7
	Neutral	26.1	11.2	11.2	12.5	13.6
	Good/	58.5	21.0	23.1	60.4	32.7
	Excellent					
3 rd	Poor/Fair	17.6	68.2	65.4	32.1	49.6
	Neutral	22.9	12.9	14.6	11.5	17.8
	Good/	59.5	18.9	20.0	56.5	32.6
	Excellent					
4 th	Poor/Fair	19.7	70.3	69.0	40.2	58.3
	Neutral	22.0	9.4	11.1	13.4	10.2
	Good/	58.3	20.3	19.8	46.5	31.5
	Excellent					
5 th	Poor/Fair	19.4	67.7	65.6	42.5	52.8
	Neutral	24.2	12.9	11.5	10.0	16.8
	Good/	56.5	19.4	23.0	47.5	30.4
	Excellent					
6 th	Poor/Fair	14.9	64.0	70.8	29.2	46.5
	Neutral	26.3	16.7	13.3	19.5	18.4
	Good/	58.8	19.3	15.9	51.3	35.1
	Excellent					

“Second Set” bias

Since each reviewer was initially asked to review only six of the twelve sites included in the project, the question arose as to whether the reviewers should be allowed to evaluate an additional group of the other six sites. An option was provided for reviewers to send a message requesting the opportunity to review more sites on the “Thank you” page following completion of their first groups of six. Twenty-four respondents (i.e., 14% of the sample population) did review an additional group of sites.

Two questions were evaluated with respect to this procedure:

- did reviews by those individuals who completed two sets differ from those of respondents who completed one set; and
- did responses to the second set of surveys differ significantly from the first set among those reviewers who reviewed two sets of companies?

The first question was examined by comparing the responses of the two groups with the Chi-square statistic (see Table 6). There was no significant difference on any of the five variables between the responses of those who completed six or fewer site reviews and the responses of those who completed more than six.

Table 6. Distribution of Responses to Five Site Evaluation Questions By the Number of Companies Evaluated (%)

Number of evaluations completed	Site Rating	Overall	Likelihood of purchase on-line	Likelihood of purchase by mail order	Likelihood of purchase from retail outlet	Likelihood of return to on-line site
6 or fewer	Poor/Fair	16.7	66.9	66.2	31.1	51.4
	Neutral	26.7	12.3	13.2	13.9	15.9
	Good/Excellent	56.7	20.8	20.5	55.0	32.7
7 or more	Poor/Fair	16.5	70.5	69.1	36.2	55.5
	Neutral	19.8	10.3	9.4	10.8	13.5
	Good/Excellent	63.7	19.2	21.6	53.0	31.0

To test the second issue, an F-test was used to evaluate the consistency with which respondents reviewed the first and second groups of companies. Again, there were no significant differences. Therefore, no biases were introduced in the data by allowing respondents to evaluate more than one group of sites.

Multiple Session Bias

Since completed reviews indicated the time and date they were submitted, it could be determined whether a reviewer completed all six site reviews in a single session or whether they were spread over time during the survey period. The possibility of completing the survey in a single or multiple sessions raised two issues which were tested. First, do the site ratings of respondents who choose to complete the survey in a single session differ from those who use two or more sessions? Secondly, do the responses of those who choose to complete the survey in multiple sessions differ over time?

With regard to overall site ratings, likelihood of purchase and likelihood of return, respondents who evaluated all six sites in one session were significantly different than those who used two or more sessions (see Table 7). In general, respondents who completed the site evaluations in a single session were more critical of the sites ($\chi^2 = .017$), were less likely to make a purchase on-line or from a retail outlet ($\chi^2 = .071$ and $.034$, respectively), and were less likely to return to the site ($\chi^2 = .004$). This suggests that limiting a respondent's options to completing all site evaluations at once could bias results by discouraging those who prefer to complete reviews over an extended period of time and tend to rate sites higher.

There was no significant difference in the sites reviewed by those who used multiple sessions between their initial reviews and those in subsequent sessions. Thus, there is no apparent bias in allowing respondents to review sites as their time allows.

Table 7. Distribution of Responses to Five Site Evaluation Questions By the Number of Sessions Used to Complete the First Set of Company Evaluations (%)

Number of sessions to complete first set of evaluations	Site Rating	Overall	Likelihood of purchase on-line	Likelihood of purchase by mail order	Likelihood of purchase from retail outlet	Likelihood of return to on-line site
1	Poor/Fair	20.0	70.8	69.1	34.7	56.6
	Neutral	25.2	10.8	11.7	11.5	13.8
	Good/	54.8	18.4	19.1	53.8	29.6
	Excellent					
2 or more (1st session)	Poor/Fair	9.3	61.4	60.2	19.3	42.2
	Neutral	27.9	15.9	13.6	18.2	13.3
	Good/	62.8	22.7	26.1	62.5	44.4
	Excellent					
2 or more (2nd and subsequent sessions)	Poor/Fair	13.5	63.5	64.4	30.4	45.4
	Neutral	24.0	13.5	13.5	14.9	21.3
	Good/	62.6	22.9	22.1	54.8	33.3
	Excellent					

Discussion

The obvious downside to this type of research is sample selection. While not ideal, this method is perhaps the best option currently available to identify this sub-population of Internet users, for it attracts visitors through the use of the same methods employed by food and drink companies on-line. They, too, list their sites with Internet browsers, trade links with related companies, attempt to post messages on appropriate newsgroups and mailing lists (without coming across as "Spam" -- unsolicited advertisements), and rely on word of mouth from satisfied visitors.

Use of this method and these types of announcements also ensure that respondents are who they claim to be. There is no concern, for example about the definition of an "Internet user" or "access to the Internet," as there has been with some random telephone surveys. Respondents to this project must be familiar with use of the technology both to find the survey and to complete it. Therefore, someone who describes himself as an Internet user but uses the Internet only for e-mail or a person with "access to the Internet" though his or her spouse, is not included in the sample population.

An unexpected aspect of this methodology is the fact that many participants see the project itself as a form of entertainment. Many of them spent as much as an hour completing a set of six company evaluations, paid on-line connection fees for their time, and then offered (or asked permission) to complete additional evaluations immediately or in future projects. Several respondents' language suggested that they saw the evaluation process as an enjoyable game --

“I’ll play some more.” Others described it as an “excuse to surf the Net” or a valuable resource for discovering new Internet sites of interest to them.

This entertainment value could be an important component in generating sample size. In addition to encouraging respondents to complete the full set of site evaluations assigned to them, it led some participants to promote the survey on food and drink newsgroups and mailing lists in which they are active. These recommendations seem to generate more attention than postings from the investigator, since they are perceived as legitimate topics for discussion rather than “Spam”. As the novelty of Internet research wanes, larger incentives for survey participants may be required.

Finally, the method allows for immediate feedback from an international audience. Multiple electronic mailings to respondents can take place in a fraction of the time associated with traditional mail surveys and with none of the associated costs. Respondents with questions about the survey can be addressed immediately, and results can be made available via the Internet to all interested parties as soon as they are prepared.

The method used in this project proved itself to be useful and reliable for analyzing consumer reactions to commercial WWW sites. However, we fully anticipate that the methodology of on-line surveys will change as the Internet and its users evolve.

For example, the increasing use of new HTML features such as frames, audio, and video provide an opportunity to structure surveys so that they are easier to for the respondent to understand and navigate. The challenge for researchers is to incorporate these features only when they are widely accepted by the Internet population. If the technology incorporated in a survey is too close to the cutting edge, we risk eliminating that population of users who lack the capability to participate. If an on-line survey is perceived as “behind the times”, we potentially lack credibility with the user group we are trying to attract.

Additionally, it may become more difficult to solicit information, particularly personal information, as Internet users become increasingly concerned with how it will be used. At present, participants appear to be satisfied with assurances of privacy within an academic project.

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