

Conducting Research on the Internet: Online Survey Design, Development and Implementation Guidelines

Dorine Andrews, D.C.D.
Research Professor,
Communication, Culture and
Technology Program
Georgetown University
Washington, DC
dca4@georgetown.edu

Blair Nonnecke, Ph.D.
Assistant Professor
Computing & Information
Science
University of Guelph
Guelph, Ontario
rbn@acm.org

Jennifer Preece, Ph.D.
Professor and Chair, Information
Systems Management Dept.
University of Maryland Baltimore
County
Baltimore, Maryland
preece@umbc.edu

Abstract

Using the Internet to conduct quantitative research presents challenges not found in conventional research. Some of our knowledge concerning the effective design and use of paper-based surveys does translate into electronic formats. However, electronic surveys have distinctive technological, demographic and response characteristics that affect how they should be designed, when they can be used and how they can be implemented. Survey design, subject privacy and confidentiality, sampling and subject solicitation, distribution methods and response rates and survey piloting are critical methodological components that must be addressed in order to conduct sound online research. This paper focuses on those distinctive characteristics. It reviews the current literature on the subject of electronic surveys and presents guidelines for designing, developing and implementing them, particularly web-based surveys. This paper argues that Web-based surveys are superior to email surveys in many aspects, but that email combined, perhaps with offline media, is an excellent vehicle for inviting individuals to participate in Web-based surveys. The application of these guidelines are demonstrated through the authors' current research involving defining the nature of "non-public participation" (commonly referred to as lurking) in online discussion groups. Guidelines do not eliminate the many "trade-off" decisions required in the use of online surveys.

Keywords: Electronic surveys, web-based surveys, email surveys, methodology, online community, research techniques, Internet research.

Introduction

It is well recognized in the behavioral sciences that surveys are not perfect vehicles for collecting data because surveys require subjects to recall past behavior [Schwarz, 1999]. Some social scientists contend that observation captures behavior more accurately [Bernard, et al., 1981; Bernard, et al., 1983] and there is ample data to support their position. For example, online consumers overestimate the amount they purchase online by 55% [Comscore, 2001]. Others suggest that the survey questions bias subject judgements and answers [Schwarz, 1999]. One alternative, many contend, is to collect behavioral data using multiple approaches [Sudweeks & Simoff in Jones, 1999; Rogers, 1987]. Observations, focus groups, individual interviews, email, Web-based, postal, and

random digital dial telephone surveys can be used in combination to improve results quality [Smith, 1997] and sample representativeness [Yun & Trumbo, 2000; Swoboda, et al., 1997]. For example, Yun & Trumbo (2000) achieved a 72% return rate within a one-month period by combining postal, email and Web-based survey forms.

However, research costs, access to subjects, the scope of the research and the nature of behavior under study may make it impractical or financially unfeasible to use more than one data collection approach. Electronic surveys provide the ability to conduct large-scale data collection by others than organizations at the centers of power in society [Couper, 2000]. The technology provides an inexpensive mechanism for conducting surveys online instead of through the postal mail [Sheehan & Hoy, 1999; Weible & Wallace, 1998] and one in which costs per response decrease instead of increase significantly as sample size increases [Watt, 1999]. Electronic surveys are becoming increasingly common [Lazar, J & Preece, J., 1999], and research comparing electronic vs. postal surveys is starting to confirm that electronic survey content results may be no different than postal survey content results, yet provide strong advantages of speedy distribution and response cycles [Yun & Trumbo, 2000; Swoboda, et al., 1997].

Some of our knowledge concerning the effective design and use of paper-based surveys does translate into electronic formats. However, electronic surveys have distinctive technological, demographic and response rate characteristics that affect how they should be designed, when they can be used and how they can be implemented [Sohn, 2001]. This paper focuses on those distinctive characteristics.

Two forms of electronic surveys have emerged in the last fifteen years. The first, asynchronous email survey dates back to 1986 [Kiesler & Sproull, 1986]. The second, synchronous Web-based survey, started about 1994 [Kehoe & Pitkow, 1996]. There are several fundamental differences between email and Web-based surveys. First is database technology. Web-based surveys provide the ability to automatically verify and store survey responses using database technology and an HTML (hypertext markup language) user interface. Email surveys and responses, whether embedded directly within an email message or attached as a word processed document, must be manually transferred and entered into storage. Second, email is a “push” technology that allows researchers to directly communicate with prospective respondents. Web-based surveys do not provide this affordance of direct communication. This paper argues that Web-based surveys are superior to email surveys in many aspects, but that email combined, perhaps with offline media, is an excellent vehicle for inviting individuals to participate in Web-based surveys. Five methodological components of online survey design and implementation are critical to

successful Web-based surveys. These are (1) survey design, (2) subject privacy and confidentiality, (3) sampling and subject selection, (4) distribution and response management, and, (5) survey piloting.

Survey Design Guidelines

Technically, electronic surveys should be designed to (1) support multiple platforms and browsers [Yun & Trumbo, 2000], (2) prevent multiple submissions [Yun & Trumbo, 2000], (3) have the ability to present questions in a logical or adaptive manner, if needed [Kehoe & Pitkow, 1996], (4) provide multiple opportunities for saving the work in long questionnaires (e.g., over 50 questions) [Smith, 1997], (5) collect both quantified selection option answers and narrative type question answers [Yun & Trumbo, 2000], and, (6) provide feedback “thank-you” upon completion of the survey [Smith, 1997].

Email survey research has established that email surveys meet some, but not all, of the electronic survey criteria cited above. The format of email survey can accommodate the principles of paper questionnaire design [Oppenheim, 1992; Dillman, 2000; Preece et al, 2002]. These principles include the development of question scales and multiple choice answers from qualitative exploratory interview data, elimination of question bias through proper wording, and the use of clear, unambiguous and concise wording. Like postal surveys, successful email surveys have been shown to include: informed consent information, rating definitions and examples, rating scale formats such as Likert type, semantic differential scales and nominal scales, and a set of demographic items [Preece et al, 2002; Witmer et al, 1999]. In addition, open-ended questions can be successfully accommodated in email surveys. Respondents were found to write lengthier and more self-disclosing comments than they do on mail surveys [Schaefer & Dillman, 1998; Bachmann & Elfrink, 1996; Kielser & Sproull, 1986; Loke & Gilbert, 1995].

Email also affords the technical ability to track whether the delivered email survey was opened, responded to or/and deleted as well as if the survey was undeliverable [Paolo et al., 2000]. However, email surveys have significant technical drawbacks. They can be altered by the survey takers themselves [Witmer et al., 1999]. There is no way to prevent someone from changing, eliminating or adding questions to the survey. Email surveys have also been found to be confusing to complete by respondents [Sheehan & Hoy, 1999]. This may be caused by the fact that email survey completion is dependent upon the email software if the survey is included in as part of the email, or on the word processing software if the survey is attached as a document. How respondents enter the answers to the survey question may vary because of this. Some respondents may not know how to manipulate the survey text to

enter the responses correctly. In other words, the researcher does not have control over how the questions are displayed by software and how responses are entered into the email survey text.

Like email surveys, Web-based surveys have the advantage of low cost and quick distribution. Additionally, Web-based surveys provide the ability to transfer survey responses directly into a database, eliminating transcription errors and preventing survey alteration by the survey respondent. Initially technical issues inhibited the use of Web-based surveys, but new software and Internet related technology appear to be mitigating many of the technical limitations [Smith, 1997; Kehoe & Pitkow, 1996; McCoy & Marks, 2001]. Software applications such as Cold Fusion [McCoy & Marks, 2001] and software applications such as “Survey Wiz” and “FactorWiz” [Birnbbaum, 2000] eliminate many of the construction and administration challenges of Web-based surveys.

The principles of paper design apply to Web-based surveys as with email surveys. Although questionnaire screen design is more complex because it must be developed in HTML and supporting scripting and database languages, Web-based surveys provide additional format and response control [Preece et al 2001; Stanton, 1998]. For example, radio buttons prevent multiple answers when only one is called for. Both coded and open-ended questions can be accommodated in Web-surveys. In a study using a Web-based survey where open ended questions were located after a set of coded questions, over 70% of the respondents provided additional information and explanations through the open ended question opportunity [Andrews et al, 2001]. However, it appears that attrition rates increase when using many open-ended questions requiring multiple items in the answers [Crawford et al., 2001] or when using questions that are arranged in tables on Web-based surveys [Knapp & Heidingsfelder, 1999]. This contradiction in attrition may be the result of question placement and whether the questions are optional or required.

The Web-based survey designer has a wide range of textual options, format control and graphics sophistication not attainable with email surveys. The advantages include links, clicks, defaults and menus [Preece et al, 2002]. Links provide the ability to directly reference definitions or examples at multiple points in the survey. Clicks eliminate the need for textual data entry for all coded questions. Defaults, hidden or displayed, reduce non-response to questions. Menus, drop-down or displayed, provide an economical way to display many response options without cluttering the survey screen. Additionally images, animation and color enhance survey presentation [Yun & Trumbo, 2000] but have disadvantages of increasing download time and may also affect the answers

subjects do or do not provide [Couper et al., 2001]. In addition, the survey designer cannot control the survey presentation as he/she would in a paper survey. Browser settings, user preferences and variations in hardware put the user in control [Couper, 2000]. Such variation and resulting poor design from the misapplication of Web-based technical capabilities increase the likelihood of response error and defeat Web-based survey advantages. Dillman et al. [1998] found that surveys with multiple or graphic designs that do not make clear what the respondent is to do resulted in higher attrition (drop out) rates than those surveys using more straightforward, plain designs. Dillman [2000] also warns that

poorly designed Web-based surveys encourage novice Web-users to break off the survey process, making them less effective than email or postal surveys.

In summary (Table 1), Web-based surveys present many more design options than email surveys and provide researchers

Table 1: Electronic Survey Design Evaluation

Design Items	Email	Web-based
• Supports multiple platforms and browsers	Yes	Yes
• Controls for browser settings	No	No
• Prevents multiple submissions automatically	No	Yes
• Presents questions in a logical or adaptive manner, e.g., provides control of when and how questions displayed	No	Yes
• Allows saving responses before completion	No	Yes
• Collects open-ended or quantified-option responses	Yes	Yes
• Provides automatic feedback with completion	No	Yes
• Can apply paper questionnaire design principles	Yes	Yes
• Provide automatic transfer of responses to database	No	Yes
• Prevents survey alteration	No	Yes
• Provides response control and economical displays	No	Yes
• Provides researcher control over question presentation	No	Some
• Provides for animation, sound, graphics options, etc.	No	Yes
• Does not requires familiarity with survey software	No	Yes
• Rapid display to respondent	Yes	Depends
• Technical ability to track response source	Yes	No
• Technically easy to design and implement	Yes	No

with increased control over respondent use of the survey. However, Web-based surveys are more challenging to design and more technically difficult to implement because of these options.

Subject Privacy and Confidentiality Guidelines

Online researchers may commit multiple violations of individual and online community privacy that can be more intense than those found in conventional survey methods [Cho & LaRose, 1999]. They define physical (unsolicited requests), informational (personal information control), psychological (personal choice control), and interactional (relationship control) privacy infringements that manifest themselves in both email and Web-based surveys. For example, in one study, email pre-notification and follow-up procedures for a survey were found to invade the individual's physical computer space. Receivers considered the email to be rude, unsolicited "spam"

[Schillewaert, et al., 1998; Swoboda et al., 1997]. Surveys violate informational privacy when they do not allow control over the conditions of release, use, retention, and disposal of personal data. Privacy is also breached when sampling lists are culled from non-public discussion groups and listservers.

The flexibility of the Internet and the ease with which false identities are created on the Internet exacerbate trust and confidentiality issues according to Cho & LaRose and can make survey results unreliable. Personal choice and voluntary prudence of others protect psychological privacy [Burgoon, et al., 1989] by allowing individuals to evaluate whether or not they wish to participate in the survey. Cho & LaRose [1999, p. 427] suggest online surveys that “rely on the trolling method to develop sampling frames or that contacting respondents through online communities raise the concern.” This sampling technique, commonly called convenience sampling because large numbers of potential respondents are gathered without regard to demographic characteristics, is an attempt to reduce bias by getting large numbers of people to participate. As a result, researchers have observed uninhibited displays of emotional and psychological states that invade individual privacy causing large numbers to refuse to participate in the unsolicited surveys. Also, Cho & LaRose [1999] suggest that if researchers better manage interactional privacy, the willingness to disclose information increases. For example, they conclude that online surveys with little author reputation, authority and professionalism breach this interactional privacy as does entering communities because these communities are often sources for emotional support.

Therefore, Cho & LaRose make recommendations for mitigating privacy issues that may help build a trusting, quality relationship between the survey subjects and the researchers. These include (1) separate the invitation to participate (e.g. consent) from the survey questionnaire, (2) offer e-incentives as a trade-off for the intrusion, (3) collect data through Web pages, (4) provide multiple response options, (5) use remailers, entities that disguise actual email addresses with pseudonym addresses to prevent tracability back to the original author, to ensure anonymity in email surveys, (6) do not troll through observation, (7) do not use cookies, (8) do not use links from personalized sites, (9) provide disclosures, (10) certify privacy through 3rd parties, (11) use credible domains, (12) use encryption for extremely sensitive material, (13) use hypertext links for long disclosures, (14) disclose sampling procedures, (15) obtain consent of online community leaders to obtain email addresses and even have leaders provide the message, and, (16) post survey results or summaries of results. In addition, establishing credibility quickly in subject lines and opening statements would appear to be critical in managing privacy concerns

in email or Web-based surveys. Using “opt-in” email lists provided by email list brokers for market research is also recommended [Yun & Trumbo, 2000].

In some survey situations, subject identification is critical to longitudinal studies where the same subjects are surveyed multiple times. The use of self-selected user ids and the choice of “rather not say” for sensitive questions has been successful in providing some sense of privacy [Kehoe & Pitkow, 1996]. Some researchers suggest that lack of anonymity may not affect response rates [Couper et al., 1999] while others suggest anonymity is important to response rates [Kiesler & Sproull, 1986]. These conflicting findings may be the result of subject matter differences. For these reasons, some researchers guarantee confidentiality (i.e. no one will see your personal data or know you were a subject in the study), but not anonymity (i.e. the researchers will know who you are) and recommend explaining the method for keeping the confidentiality to the survey takers [Sheehan & Hoy, 1999].

In summary
(Table 2), both email and Web-based surveys present issues of privacy and confidentiality infringement that must be addressed if researchers wish to collect personal information from respondents to ensure qualification to complete the survey. Collecting data through Web-based surveys provides improved opportunities to

Table 2: Subject Privacy & Confidentiality Evaluation

Privacy & Confidentiality Items	Email	Web-based
1. Respondent can designate conditions of release, use, retention and disposal of personal data	Yes	Yes
2. Do not sample from non-public email lists, discussion groups and listservs	Yes	Yes
3. Send invitations and surveys separately	Yes	Yes
4. Offer e-incentives	Yes	Yes
5. Collect data through web pages	No	Yes
6. Provide multiple response options	Yes	Yes
7. Use “re-mailers” to ensure anonymity	Yes	Not needed
8. Do not troll through observation	Yes	Not needed
9. Do not use “cookies”	Not needed	Yes
10. Do not use links from personalized sites	Not needed	Yes
11. Provide disclosures	Yes	Yes
12. Provide 3 rd party privacy certification	Yes	Yes
13. Use credible domains	Not needed	Yes
14. Use encryption for sensitive material	Yes	Yes
15. Use hypertext links for long disclosures	No	Yes
16. Disclose sampling procedures	Yes	Yes
17. Community leader consent for member email addresses can be obtained	Yes	Yes
18. Provide survey results to respondents	Yes	Yes
19. Use self-selected user ids, passwords (option)	No	Yes
20. Provide “rather not say” response option for sensitive questions	Yes	Yes

protect respondent confidentiality over email. Personal data can be stripped from the responses and manual transcription of completed survey responses is not required. However, building sufficient trust to get people to

participate requires multiple disclosure, design and distribution strategies on the part of the researchers and the enlistment of third party guarantors.

Sampling and Subject Selection Guidelines

Couper [2000] provides a topology for Web-based surveys based upon sampling technique. This topology includes (1) non-probability methods of sample selection entertainment, self-selection, and volunteer panels of Internet users, and, (2) the probability-based sample selection methods of intercept, list-based high-coverage, mixed-mode design with choice of completion method, pre-recruited panels of Internet users, and probability samples of full populations. Researchers are concerned with all except the first type -- Web-based surveys as entertainment. Couper [2000] defines each type and its advantages and disadvantages. Self-selection Web-based surveys post invitations to participate at multiple online locations. There is no attempt to statistically sample the online population, although some claims for scientific validity are sometimes made. Volunteer panels of Internet users are fast growing in industry of late. Subjects are selected for the panel by submitting demographic information at a portal, then are asked to participate by invitation-only to a survey. Although researchers have more information about the subjects, the base of this approach is still self-selection, not a sound statistical sampling approach. Probability-based methods begin with knowledge of a sampling frame and with information on the process of recruitment that permits measurement of sources of non-response, which can inform design-based adjustment approaches. These types of surveys either restrict the sample to those with Web access, thereby defining the population or use a mixed mode to reach a broader sample of the population. Intercept surveys target visitors at a particular Website, asking every n^{th} visitor to participate in the survey, similar to an election exit poll. Issues of invitation timing result in increased potential for non-response. List-based samples of high-coverage populations start with a frame or list of those with Web access. Email invitations are sent to either to everyone or to a group on the list. This reduces non-coverage issues, but does nothing for non-response rates. In mixed-mode designs with choices of completion method, the Web-based survey is just one alternative for response. This approach is more costly and raises issues of equivalence of measurement across instruments. With pre-recruited Internet user panels, panel members do not self-select, but are recruited using probability sampling methods such as RDD (random digital dialing). Here, non-response can occur at many stages of the recruitment and survey process. The last type of Web-based survey sampling method, probability samples of full populations, provides subjects with the equipment and

tools necessary to participate. Couper [2000] believes it is the only approach that allows generalization beyond the current populations of Internet users. Recruitment response rates are low, but once participating, response rates are quite high.

Given Couper's [2000] topology, coverage error (the mismatch between the general population and the sampling frame) and random sampling within the sample frame are the biggest threats to inference from Web-based surveys to general populations [Couper, 2000]. First, people who participate in online surveys are different than the general population. Second, on the Web, a sampling frame of all online users cannot be identified. Other researchers support Couper's conclusions. For example, Georgia Tech University's Graphic, Visualization, and Usability Center (GVU) found it impossible to draw a random sample from a complete or nearly complete list of Internet users [Kehoe & Pitkow, 1996] which, in addition, makes it impossible to track non-response rates [Kehoe & Pitkow, 1997]. Indeed, some researchers claim that the only way of reliably sampling is through a national census [Robson, 1993], but this method is not suitable for all types of surveys. Also it adds extra cost and access to census information is not readily available.

Additionally, estimates of the online population and its demographics are not consistent among measuring entities [Couper, 2000]. Some studies show that those who participate in Web-based surveys may be more experienced, more intense Internet users, and have stronger Internet skill sets than those who do not participate in the survey [Kehoe & Pitkow, 1997]. They may be predominately male, younger and from households with fairly high incomes [Sheehan & Hoy, 1999; Sohn, 2001]; or consist of more whites, less African Americans and Hispanics than are in the general population [Witte, et al., 2000]. However, recent surveys geared towards examining the demography of the digital divide show that the gap between the number of men and women users has disappeared (NUA, 2001). Economics, age and ethnicity as percentages of the total population continue to have significant gaps although all ages and ethnic groups are now online (NUA, 2000). For example, Yun & Trumbo [2000] found that those who return electronic surveys tended to have high connectedness with their profession, more education, greater number of contacts with other colleagues, a greater volume of email use and more task-related email than those who completed the paper survey. Zhang [2000] found that Web-based survey respondents had a higher self-perceived ability to use the Internet, used the Web more often, were seven years younger in mean age, but did not differ significantly in years of Internet experience, Web access or gender from those who responded using fax or postal mail. In summary, whether or not the Web access will ever be universal remains speculation [Couper, 2000].

The online population is not reflective of the offline population distribution, and it is changing continually. To infer for a general population based on a sample drawn from an online population is not as yet possible and will not be possible until the online and offline populations reflect each other. In the meantime, it is suggested that marketing and promotion techniques may mitigate demographic differences, at least in some characteristics other than gender [Kehoe & Pitkow, 1996].

The inability to identify all online users finds its source in the lack of Internet central registries and the fact that many people have multiple online email addresses. This makes email and Web-based surveys limited in their ability to provide generalizable results due to self-selection, non-random and non-probabilistic sampling [Yun & Trumbo, 2000; Dillman, 2000; Schaefer & Dillman, 1998; Swoboda, et al., 1997; Kehoe & Pitkow, 1997]. For example, one study of U.S. online users chose every 6th name from a list of 55 Internet Service Providers (ISPs). Then the email addresses associated with the selected ISP were generated from Yahoo's email catalog directory service [Sheehan & Hoy, 1999]. This directory contains over 15 million names from three different sources. Email address selection was limited to the Yahoo domain name. During sample selection, sometimes the catalog displayed all names and in other cases only the first "X" number of names. Another attempt at generalization occurred when researchers collected Internet usage hours data in the survey to create subgroups from which people were randomly selected to make statistically valid statements about the Internet population as a whole [Kehoe & Pitkow, 1996].

Online sampling attempts also have applied offline sampling adjustment techniques such as over sampling (sometimes named double or convenience sampling). Over sampling is based on the theory that an overly large sample size may reduce the chances of systematically excluding segments of the population [Kehoe & Pitkow, 1996]. Smith [1997] supports this approach because he found that in email surveys, invalid emails affected sample selection validity and over sampling was used to adjust for the problem. However, over sampling alone is insufficient. Probabilities for selection can be estimated by comparing the sample (post survey) to benchmarks, such as official government statistics by matching subgroups analysis or random sampling techniques (e.g., random digit dialing) with similar demographic data [Kehoe & Pitkow, 1996; Witte et al., 2000]. Witte et al. suggest sensitivity analysis to estimate and determine weighting adjustments for representativeness across subgroups. However, as stated earlier, an online survey sample can not be as yet representative of a general population because online, some demographic groups are strongly over represented and others are underrepresented in the sample that is drawn only online [Witte et al., 2000].

In summary (Table 3), research results that are generalizable to offline or online populations will continue to be unattainable given the nature of the Internet and the disparities between online and offline populations. The continuing expansion and change of servers that make up the Internet will increasingly make it difficult for researchers to find lists of servers and assess how up-to-date that information is. ISP access policies, email filtering software, multiple email addresses for individuals and increasing volumes of email may cause a decrease in unsolicited email response rates even if it is from legitimate researchers [Sheehan & Hoy, 1999].

Table 3: Sampling and Subject Selection for Online Research
<ul style="list-style-type: none">• Online results generalizable to offline population is unattainable• Identification of online populations continue to be impractical• Alternative: Series of indicative, not generalizable, results through artificially defined sampling frames

The alternative is not to build knowledge through generalization in Internet research, but rather to build knowledge based upon a series of studies that provide indicative data. In this approach, random sampling is limited to a sampling frame that is artificially defined as a set of specific target groups, individuals, discussion groups, etc., then to follow statistical sound random sampling techniques for the artificially defined sampling frame [Coomber, 1997; Yun & Trumbo, 2000].

Distribution Methods and Response Rate Management Guidelines

Obtaining significant response rates with conventional postal surveys has always been a challenge. This situation has not changed for either email or Web-based surveys. As the volume of electronic surveys has increased, the types of populations being studied has become larger, less cohesive and less interested in the technology as the amount of unsolicited non-survey email has increased [Sheehan, 2001, Cho & LaRose, 1999]. Bosnjak & Tuten [2001] identified categories of response types that include: complete responders, unit responders (do not participate at all), answering drop-outs, lurkers (view but do not answer questions), lurking drop outs (view some but not all of the survey), item non-responders (only answer some of the questions, but complete the survey), and item non-responding drop-outs (answer some questions, but drop out before completing).

In many cases, email and Web-based surveys fail to reach response rate levels of postal surveys and may threaten the use of electronic surveys [Couper et al., 1999; Schafer & Dillman, 1998]. Email response rates of 20% or lower are not uncommon [Witmer, et al in Jones, 1999] and, although rates exceeding 70% have been recorded, they are attributed to respondent cohesiveness (e.g. an existing workgroup) as often occurs in organizational studies

[Walsh et al., 1992]. In addition, response characteristics differ between postal, e-mail and Websites. For example, email response is faster than postal survey responses [Sheehan and McMillian, 1999] without significant impacts on survey results [Yun & Trumbo, 2000; Sheehan & Hoy, 1999]. Yun & Trumbo [2000] recommend all three distribution methods, but conclude that if only one can be used and the population is an online population, the Web-based survey supported with various forms of pre-notification is advisable.

There is very little researchers can do to persuade someone to participate if he/she simply prefers not to participate. Incentives and techniques used in postal surveys to increase response rates may not be possible in electronic formats [Couper, 2000]. Technical difficulties alone may keep response rates low [Couper, 2000]. A lack of survey salience (the association of importance and/or timeliness with a specific topic to a potential survey subject) can also reduce responses [Sheehan & McMillian, 1999; Watt, 1999]. Response rates may also be affected by some systematic judgement by a segment of the population being studied, causing them to be excluded from the result [Kehoe & Pitkow, 1996; Sheehan, 2001]. For example, invitations to participate posted on discussion groups may get higher response rates from technical discussion groups because they are more interested in any type of online interaction while those groups dedicated to health support issues may interpret the survey participation request as an intrusion on their privacy. The attrition rate – the number of people who started to take the survey, but did not complete it -- can be used to reveal some systematic judgement by a group [Kehoe & Pitkow, 1996]. For example, attrition rates may be calculated if the survey captures the “link-to” source of the survey. Counts by that source for completed and partially completed surveys provide the basis for rate calculations.

Another reason for high non-response rates may revolve around issues of privacy and confidentiality [Couper, 2000]. Research also suggests that the inability to inspect the survey document prior to completing it, as can be done with a postal survey or with a Web-based survey where all the questions are on one scrolling screen, increases non-response rates [Crawford et al., 2001].

However, survey design and distribution features also affect response/non-response and attrition rates. Experiments comparing short and long email questionnaires did not show that shorter questionnaires produce significantly higher response rates than longer versions [Witmer, et al., in Jones, 1999; Sheehan, 2001]. Cash incentives [Kehoe & Pitkow, 1997, Cho & LaRose, 1999] and chances to win prizes in a lottery [Brick, et al., 1999] have been shown to increase the number of responses twice as much as altruistic motives [Tuten, Bosnjak & Bandilla, 2000]. However, such incentives may introduce a systematic bias into the study. In multi-year repeating

survey studies, incentives were shown to increase the number of completed questionnaires, but not the total number of respondents from year to year [Kehoe & Pitkow, 1997].

Another design feature that seems to affect attrition rates is the location of the request for personal (demographic) data in the survey. Attrition rates were significantly lower when personal data was requested at the beginning of Web-based survey rather than at the end of the survey [Frick et al., 1999]. Placing the data request at the end of the survey presents a surprise to the respondent to which he/she reacts negatively by dropping the survey before completing it. Placing the data request at the beginning may be perceived as honesty on the part of the researcher. This helps to create an atmosphere of greater trust and to build a quality relationship.

How survey subjects are invited to participate in the survey, and how survey completion is encouraged through reminders, can affect response rates. The perceptions of burden (the effort required to complete the survey) can be manipulated and affect non-response and attrition rates [Crawford et al, 2001]. For example, those who were told the survey would take less time, those received an automated (embedded) password, and those who received more frequent reminders, were all more likely to accept the invitation. However, these factors did not have significant effects on signing up for the survey [Crawford et al., 2001]. The use of automatically generated passwords in email invitations to protect against “ballot stuffing” and allow subjects to break off and re-enter to complete a survey can affect attrition and non-response rates. When subjects were given passwords having no ambiguous characters (e.g., 1 [one] or l [el]) their response rates were significantly higher than those subjects with password ambiguities [Couper et al., 2001].

The presentation of the survey through single email containing both a “cover letter” and the survey is likely to cause a strong negative reaction [Witmer et al, 1999; Mehta & Sivadas, 1995; Sheehan, 2001; Cho & LaRose, 1999]. A multi-step process that separates the invitation and survey presentation is recommended. For email surveys, this process includes a short email that pre-notifies and introduces the coming survey. The email requests a reply email if the user declines to participate in the survey (“opt out”) or requests a reply if the user wishes (“opt in”) to receive the survey [Witmer et al, 1999; Sheehan & Hoy, 1999; Sheehan, 2001]. Follow-up reminder emails after the first publication also appear to spike participation [Smith, 1997; Sheehan & Hoy, 1999]. More sophisticated approaches integrate online and offline contacts. In one study, contact with subjects occurred up to four times, beginning with an invitation postal letter, then a paper survey and an email survey with URL for Web version. These were followed with reminder postcards. Surveys that arrived just before the emails were found to boost

response rates to above 70% [Yun & Trumbo, 2000]. In another study, varying the interval time periods between reminders does not appear to make a difference in response rates [Claycomb et al, 2000].

It appears that Web-based surveys have an advantage over email surveys. When a Web-based survey is preceded by an email inviting individuals to the URL to participate, the Web-based survey outperforms email survey participation significantly [Smith, 1997]. However, there are still unresolved issues. Techniques to increase the potential for subjects to open and read the email invitation must be developed, given the general increase in unsolicited email [Sheehan, 2001]. The language in the subject line, the email address of the sender and the sender's name may all influence whether or not the invitation to participate is read. As with email surveys, multiple contact methods are be useful for Web-based surveys as well. Respondents in a palliative care survey were invited to participate on a Web site, listserv and newsletter. Results showed that 83% of the respondents search the Internet for clinical information, 83% use email, 69% access online medical journals and 59% were subscribers to a palliative-care related listserve or newsgroup [Pereira et al, 2001]. In addition, as discussed earlier, different groups may have dramatically different response rates based on survey salience.

In summary

(Table 4), achieving high response rates to an electronic survey depends very much upon how people are asked to participate. Web-based surveys are slightly more flexible than email surveys in that they

Table 4: Response Rate Evaluation

Response Rate Impact Items	Email	Web-based
• Technical breakdowns likely	No	Yes
• Survey can be made salient to respondent interests	Yes	Yes
• Systematic judgement by segment of survey population can be prevented	No	No
• Privacy and confidentiality issues likely	Yes	Yes
• Possible to inspect entire survey before completion	Yes	Probably not
• Possible to offer financial incentives	Not easily	Not easily
• Requests for personal data first	Yes	Yes
• No use of ambiguous characters in passwords	Not needed	Yes
• Multi-step invitation and survey presentation process	Yes	Yes
• Periodic reminders to complete the survey	Yes	Yes
• Appropriate subject line in email invitation	Yes	Yes
• Multiple ways to contact & invite respondents	Yes	Yes
• Customization to target population – invitation language, type of notification media, and follow-up process	Yes	Yes
• Save responses to partially completed survey	No	Yes

can be separated from the invitation to participate (e.g., email, advertisement or posting) yet connected to it through the URL link in the invitation. Web-based surveys also allow question grouping and modularization. Partially completed survey data can be saved even if the survey taker abandons the survey before all questions are answered so attrition rates can be calculated. However, the distribution of any electronic survey must be carefully planned.

The language used in the invitation, the type of notification media and the follow-up process (e.g., the type, and number, of reminders) must be customized to the target population. Distribution techniques can and will invade privacy of some individuals and groups online. Therefore, no detail should be overlooked.

Survey Piloting Guidelines

Motivating subjects to complete a survey increases as question difficulty increases (e.g., question interpretation, data entry volume, number of choices), respondent's ability to answer decreases (e.g., perform complex mental tasks, make judgements), and respondent's motivation decreases (e.g., topic salience, belief in usefulness of questionnaire) [Krosnick, 1999]. Therefore, survey piloting is crucial to achieving research goals and ensuring that subjects complete the survey. To quote a leader in survey development, "Survey piloting is the process of conceptualizing and re-conceptualizing the key aims of the study and making preparations for the fieldwork and analysis so that not too much will go wrong and nothing will have been left out" [Oppenheim, 1992, p. 64].

As stated earlier, going online with a survey does not preclude poor design. The design of response alternatives (open and closed questions, frequency scales, reference periods, and rating scales) and question context (researcher's epistemic interest, and adjacent questions) can create bias that may destroy the quality of any survey [Schwarz, 1999; Krosnick, 1999]. Inattentiveness to detail also inhibits quality. For example, Preece et al. [2002] found common errors in electronic surveys to include (1) requests for exact demographic data when a range would be more appropriate (e.g., age), (2) overlapping scales (e.g., 1-3, 3-6), (3) missing and inaccurate instructions, (4) the use of specialist terms, and (5) insufficient space for open ended question answers. Other errors are subtler. For example, inaccurate motivational techniques embedded in the survey or the invitation (e.g., estimated completion time, progress indicators calibrated to show time to completion) may create distrust and subsequently increase abandonment [Crawford et al., 2001]. The way a question is contextually framed and worded may encourage subject acquiescence in responses (e.g., attempting to anticipate correct answers or answers expected by the researcher) [Krosnick].

In discussing the piloting of paper based surveys, Oppenheim [1992] stresses that piloting begins with question development because every question, every question sequence and every scale used in the survey must be tested and re-tested as improvements are made. In addition to the questions, the question lay-out, instructions to

respondents, the answer categories and even the question numbering systems should be tested along with the sampling and data analysis techniques.

Researchers [Dillman, 2000; Schwarz & Sudman, 1996] have developed numerous procedures for survey pretesting. Dillman [2000] suggests a multi-stage testing process that integrates testing techniques and can be applied to either paper or electronic surveys (Table 5). The process begins after the survey is considered “ready” by its developers. Stage 1 consists of a review by knowledgeable colleagues and analysts to ensure question completeness, efficiency, relevancy, and format appropriateness. In Stage 2 cognitive pretesting consists of observation

and “think aloud” protocols while a respondent

Table 5: A Survey Pilot Process

<i>Stage One:</i>	<i>Stage Two:</i>	<i>Stage Three:</i>	<i>Stage Four:</i>
Survey by knowledgeable colleagues to ensure question completeness, efficiency, relevancy and format appropriateness	Observation and “think aloud” protocols test respondents complete survey. This is followed with retrospective interviews.	Small pilot study that emulates all the procedures proposed by the main study.	Last check by non-researchers for typos and errors inadvertently introduced during the last revision process

completes the survey and is followed with a retrospective interview. This evaluates cognitive and motivational qualities of the survey. This helps to ensure wording understandability, interpretation consistency, logical sequencing, and overall positive impression from the look and feel of the survey. Stage 3 consists of a small pilot study that emulates all the procedures proposed by the main study. Dillman [2000] suggests, for large surveys, that a sample of 100-200 individuals complete the survey and that the resulting data be analyzed to determine opportunities and needs for question scaling improvement, to reduce the number of questions because of high correlation, to eliminate or change questions with high non-response rates, to test if open ended questions provide useful information, and to estimate response rates. In the last stage, Stage 4, researchers conduct one last check using people who have no connection to the survey. The objective is to catch typos and errors that may have been inadvertently introduced during the last revision process. This approach reflects similar pilot testing approaches used in systems and Web-development [Preece et al., 1994] as well as conventional survey development [Oppenheim, 1992].

Through online survey piloting, researchers have encountered unanticipated consequences that either delayed or aborted their studies [Smith, 1997; Witmar et al., 1996]. Witte et al. [2000] found that their survey was too long. As a result, they modularized it offering only one module (randomly) to subjects with the option of

completing additional modules at the end of the survey. Seventy percent of their subjects completed the additional modules. Web specific question structuring problems have been revealed through piloting [Preece, 2002]. These problems include but are not limited to such items as: too many open-ended questions, incorrect defaults (hidden or revealed), large enough text boxes that scroll, question independence (so one mistake does not invalidate the complete survey), ambiguous wording, inconsistent terminology, non-orthogonal categories, overlapping categories, and answers that can't be undone.

Piloting can also reveal undeliverable email, declined, and completed survey rates which are useful for estimating the amount of over sampling that may be required to attain a valid sample size for a particular confidence level [Sheehan & Hoy, 1999]. Web technology allows researchers to track and analyze survey non-responses by question using log files to understand why a survey is not being completed [Bosnjak & Tuten, 2001]. This may be helpful in testing question sensitivity, clarity and understandability. To use this technique, each question must be displayed separately on a screen, participants are not forced to provide an answer before moving on, and each page of the questionnaire must be downloaded separately from the server and not allowed to reside in the Web browser's cache memory. This makes for an awkward and time-consuming survey taking process. In one pilot case, subjects consistently abandoned the survey at the same point allowing researchers to identify unclear instructions as the reason for survey abandonment [McCoy &

Marks, 2001]. In the second case, the abandonment rate was 5% and no major flaws were revealed in instructions or format [McCoy & Marks, 2001].

In summary (Table6), a conscientious and complete pilot of the survey and the survey distribution and data collection process can help to avoid painful mistakes that can ruin an important research project.

Table 6: Frequent Mistakes Caught through Piloting

- Bias in question/answer wording
- Inconsistent wording and spelling errors.
- Requesting inappropriate demographic data
- Overlapping question scales or selection options
- Inaccurate or missing instructions
- Technical vocabulary with no definitions
- Insufficient space for open-ended question answers
- Lack of motivational techniques to go to the survey and/or complete it

Guideline Summary

It appears that a Web-based survey is the most appropriate format for online data collection when research costs are a constraint, timeliness is important and the nature of the research requires it. However, this method does

present both technical and administration challenges that do not exist with postal or email surveys. Past research provides many insights for designing, testing and using Web technologies. However, sampling and distribution remain challenges to any online survey research effort. Careful analysis of the study population should be conducted to determine whether probability-based or non-probability-based approaches to sampling are appropriate and whether mixed media should be used to reach offline populations as well as online populations should be sampled using other survey formats. In all cases, full recognition of the limitations of the sampling method must be well documented. Piloting is a must to perfect the survey as much as possible because response rates will be low. A participant reminder plan is essential in addition to a carefully constructed invitation to participate that motivates the target population to participate. Confidentiality and privacy must be assured. Subjects should be informed regarding the study itself, how the results will be used, and reassured regarding the credibility of the researchers. A third party guarantee should be obtained if possible.

Because online surveys are so different from postal surveys, many issues regarding Web-based online surveys remain unresolved, providing ample opportunities for continuing research. For survey practitioners, current survey knowledge can be used with caution as a preliminary set of guidelines for survey development. The more we use Web-based surveys systematically in research and report those findings, the more gaps in our knowledge of this field will be filled.

Guidelines Application: Research Background

The current research explores and defines the nature of participation in online discussion groups, especially those aspects of “non-public participation” commonly referred to as “lurking.” When lurking is defined as “not posting to a discussion group,” the mean level of “non-public participation” for all discussion groups is lower than the previously reported 90% and the volume of lurking can vary dramatically among different online discussion groups [Nonnecke & Preece, 2001]. For example, health-support discussion groups have, on average, significantly fewer lurkers (46%) than software support discussion groups (82%) [Nonnecke & Preece, 2000].

As recommended in Sudweeks & Simoff [1999], this research sought to balance the strengths of quantitative and qualitative methods to provide multiple perspectives that can be refined and integrated into a single model. Preceding the quantitative logging study [Nonnecke & Preece, 2001] a qualitative study was conducted to collect preliminary data as to why peripheral members of online communities “lurk.” It consisted of ten face-to-face

semi-structured interviews. The results guided discussion group selection for the logging study as well as the current study to examine causal factors. The interview results indicated that non-public participation is a strategic activity. Researchers were able to propose a preliminary model, called the gratification model, to categorize the reasons for lurking. It suggests that support and information gathering needs can be met through non-public participation [Nonnecke & Preece, 2001]. Seventy-nine stated reasons for non-public participation were grouped into four categories: member characteristics, group characteristics, membership life cycle stage, and external constraints [Nonnecke & Preece, 2001]. This study, a quantitative online survey, will be used to refine and validate the proposed model of the qualitative study. The research is seeking answers to the following questions:

1. Do age, gender, education level, experience with Internet, experience with online community technologies, work status, and/or work environment affect the amount of lurking one does and the reasons for doing it?
2. How does membership in multiple online communities, frequency of access, the type of community or the technology used by the community influence the amount of lurking one does or the reasons for it?
3. What, if any, are the relationships between lurking and stage of membership within an online community (e.g., joining and leaving an online community)?
4. What is the relationship of “feeling like a member of a community” and lurking?

The researchers were faced with many decisions regarding design and distribution of the survey. As researchers made decisions regarding survey design, subject privacy and confidentiality, sampling and subject selection, distribution and response rate management, and survey piloting, they used the knowledge from the literature (a complete reference list is included). In addition, these assumptions about the nature of the behavior under study and the scope of their research were made:

- All potential survey subjects are Internet users
- Getting people who do not post in discussion groups to respond to a survey may be problematic
- Subject identities are not required for anything other than follow-up interviews of a small subset of respondents to clarify response pattern clarification, if needed
- Topic salience was going to be a major problem for almost all respondents (i.e. reasons for joining or leaving a discussion group are, most likely, of no interest to members of a sports discussion group, for example)
- Using the population of all online discussion groups as the universe from which a representative random sample is drawn is not possible

- Researchers' university affiliations and reputations must be leveraged to establish survey credibility
- Funding to incent survey participation is not available
- The survey could easily become lengthy based upon the previous qualitative study results
- Results from the qualitative survey will guide the language used in the online survey

After reviewing the literature on electronic surveys, their first decision was to use a web-based survey using email invitations and reminders posted in public online discussion groups. The research team had a working knowledge of survey development, web and database technologies as well as access to additional technical resources.

Guidelines Application: Survey Design Decisions

Cold Fusion, Microsoft Access and HTML were selected for the technical design. This allows researchers to (1) support multiple platforms and browsers [Yun & Trumbo, 2000], (2) prevent multiple submissions [Kehoe & Pitkow, 1996], (3) provide multiple opportunities for saving respondent answers [Smith, 1997], (4) collect both coded and open-ended responses [Yun & Trumbo, 2000], and, (5) provide immediate "thank-you" feedback upon survey completion [Smith, 1997]. This technical approach also provides the ability to track respondent identity for follow-up interviews if they "opt in" to follow-up interviews and, at the same time, protect individual privacy without the use of cookies [Cho & LaRose, 1999]. Also, if the survey proves, in piloting, to require more than 10 minutes to complete, it allows researchers the option of providing re-entry access using non-cookie passwords. The technology also allows a respondent who belongs to more than one community in the study to complete the survey for each community while at the same time prevent "ballot stuffing." The processing logic produces a gently worded error message: "It appears you have already completed a survey for this online community. Please contact the survey administrator at the link below to investigate the problem", if ballot stuffing occurs.

The survey is designed to have a professional, simple layout using a straightforward navigation strategy, keeping graphics and color to a minimum in an effort to add credibility to the survey as well as keep downloading time as short as possible [Couper et al., 2001; Dillman et al., 1998; Preece et al., 2002]. The survey, in its current state of design, has 28 primary questions, about 20 sub-set questions, and 12 demographic items. Researchers, following an introduction page, divided these questions into three sections, each having a "submit" and "save" function: 1) demographic questions, 2) questions related to the discussion group where invitation to participate was posted, and, 3) questions related to a discussion group that was permanently left. If the respondent abandons the

survey, the data from the completed sections is not lost. This was a compromise between having the whole survey on a single page vs. displaying each question on its own page. The download and submit processing time required for over 50 single pages or one very large page was considered too burdensome. When a survey is completed, the respondent immediately thanked and notified that his/her survey was successfully completed.

The survey begins with a single introduction page. Like the email invitation that brought the respondent to the survey website, its purpose is to establish a trusting relationship with the prospective respondent that encourages him/her to proceed into the survey. To do this, there is text to (1) establish the authority and credibility of the researchers, (2) explain the survey purpose, (3) explain benefits of the results to online communities to address the salience issues of the survey, (4) establish respondent confidentiality and privacy, (5) provide open access to researchers through email address links to answer questions before starting the survey, (6) explain the sampling methodology, and, (7) provide a third party guarantee of the survey's authenticity and credibility using the Institutional Review Board approval with supporting links [Cho & LaRose, 1999].

Before demographic information is collected, a page for "opt-in" informed consent is presented along with links to small pop-up windows to display term definitions. For example, the terms 'active', 'occasional', 'join', 'participate', 'leave', 'member' and 'visitor' have links throughout the survey. These links exist in the survey questions also. A small incentive, the survey results will be available to respondents, to participate in the survey is provided on this page. By providing an email address, researchers will be able to notify the respondent of results availability. Respondents are also asked to "opt-in" to a follow-up telephone interview. Researchers explain that they intend to randomly sample a few respondents to explore results patterns more deeply, if needed.

Researchers are comfortable with asking both coded and open-ended questions, but they are limiting the open-ended questions to optional opportunities to add information at the end of a coded question set and are using text-input boxes with wrapping and scrolling, not single line entry [Preece et al., 2001; Stanton, 1998; Andrews et al., 2001]. Skipping these questions does not affect the coded survey results. Coded questions use nominal scales, Likert scales, semantic differential scales, single and multiple choice selection options [Oppenheim, 1992].

Following Dillman's [2000] four stage development process, survey design required four rounds of prototype development before researchers felt they could proceed to stage 2 – cognitive pretesting. Unlike paper surveys where questionnaire presentation is stable, web-based survey question presentation requires the extensive use of HTML tables to control layout, wording and selection option alignment with testing on numerous browsers

and preferences within browsers [Preece et al., 2002]. This was particularly important for any scales where a shift in alignment can cause misinterpretation of the question or make it unanswerable.

Question language proved more challenging than first anticipated by the researchers. In addition to maintaining question objectivity to control for bias, shorter sentences are better for reading on the screen. As Nielsen [2000] and others have demonstrated, people do not read web pages, they scan them, looking for key word and phrases. Therefore, survey questions and instructions became briefer as researchers reviewed the prototyped screens. For example, the original statement *“This second set of questions is similar to the first set, but focus on an online group which you have permanently left and no longer consider yourself to be a member of.”* became *“The questions below pertain to an online group you have permanently left.”* There is a constant struggle to maintain the balance between brevity and a friendly tone.

Researchers also had to work to eliminate redundant questions and refine the ones kept. Non-response rates are anticipated to be due to the continual growth of email and use of electronic surveys [Couper et al., 1999; Schafer & Dillman, 1998]. They anticipate a high attrition rate if the survey was too long or irrelevant to the respondent. The online community shared interests (e.g., stock market, dieting, soap operas, health) are not those addressed in the survey. The survey is collecting data about *“the different ways people use and participate in online groups.”* Therefore, each review round resulted in eliminating questions and revising the introduction and invitation.

Another challenge in question development faced by the researchers was how to present the 79 reasons and four categories for being attracted to, participating and/or leaving an online group generated from the initial interview-based study. The original idea was to use the results of the qualitative study directly, but researchers were concerned that the categories could be limiting and prototype testing proved that 79 items are overwhelming to review and select from on a single screen display without constant scrolling up and down. At the end, the researchers removed all items that could be considered duplications, put similar items together into groups of 3 and 4, and removed all category headings. An open-ended question, *“Please report any other reasons you might have...”* was added. When all of this was completed, the survey was considered ready for stage 2 -- cognitive pretesting.

Guidelines Application: Subject Privacy and Confidentiality Decisions

To protect privacy and reduce intrusion, researchers decided to post the survey invitation only to public online discussion groups rather than email individual members. Direct emailing to each group member would have

provided a mechanism for tracking individual responses, but was considered overly intrusive and for some participants would have been considered spam [Cho & LaRose, 1999]. In addition, obtaining email addresses for each group member is becoming increasingly difficult. Respondent identity will be obtained only if he/she opts to provide it. The original intention was to post the invitation only after obtaining permission from the discussion group owner, but this proved problematic in the pilot work. The invitation will be posted without owner permission, unless discussion group policies directly require owner permission to post a message that is not directly “on topic.” The invitation text (1) explains the nature of the posting, (2) builds researcher credibility and authority, (3) demonstrates third party guarantee of trustworthiness by mentioning IRB approval, (4) explains discussion group selection methodology, and, (5) explains how taking the survey may benefit the potential respondent [Cho & LaRose, 1999]. After reading the invitation, discussion group readers can ignore the post or self-select to take the survey when they click on the survey URL in the invitation. The IRB process ensures that subjects understand what they are participating in, are told of any known risks, and requires documented subject acceptance to participate in the research before research is conducted.

An “opt-in” informed consent approach was selected for this survey, as mentioned earlier. If the respondent click on “I do not accept” then proceeds with the study, the data will be permanently removed from the database. Under age respondents are asked to provide an email address of an adult who can give consent. Researchers will follow-up to obtain consent. If consent is not given, the responses of the underage respondent will be removed from the database before analysis begins.

To provide additional protection level of respondent privacy, participation in the follow-up sample is completely optional through “opt-in” selection. In addition, an email address is not required and cookies are not used. As a result, survey tracking is at the discussion group, not the individual level. If an email address is provided, this identity data is stripped from the main database before analysis begins and is accessible only by the research team in a separate database table.

Guidelines Application: Sampling and Subject Selection Decisions

Acknowledging the continuing decrease in response rates as online surveys proliferate, researchers anticipate low response rates from the target population. For this reason an easily replicated population definition and sampling approach was developed [Couper, 2000; Coomber, 1997; Yun & Trumbo, 2000]. Researchers decided

to use the probabilistic sampling method that begins with knowledge of the target population to permit the measurement of non-response at the discussion group level. However, the target population is not the total population of discussion groups, which is impossible to identify. Therefore, the results from this research will be considered indicative and no attempt will be made to infer to the general population of discussion group readers. Researchers hypothesize, based upon the high degree of variation in lurking among types of discussion groups, that there may be great variation in responses among readers in different discussion groups [Nonnecke & Preece, 2000]. Given the decision that results will only be indicative, not predictive, researchers created a sampling process that can be replicated across numerous discussion group populations. This will provide multiple, comparable indicative results which may be all Internet researchers can hope to attain given the ubiquitous and changing nature of the Internet. The following process documents the sampling process.

Step 1: Select a population to be sampled

This study is limited to asynchronous discussion groups because the previous studies were based asynchronous discussion groups. Discussion groups are aggregated by many different portal and non-portal resources such as MSN, Yahoo!, Catalist, Talkcity, Google, Altavista, <http://webcom.com/impulse/list.html>, and <http://tile.net/lists> as well as many websites that aggregate discussion group of a particular character or interest. Because previous research clearly demonstrated that different types of discussion groups have different lurker characteristics, an aggregation of heterogeneous discussion groups was determined to be ideal to continue the study of diversity. The “MSN web communities” have such diversity and was selected for that reason. There are 16 discussion group categories at the highest level of the MSN’s community hierarchy. Twenty-five percent (25%) of these categories were selected using a random number generator to narrow the sampling frame. The categories selected were (1) health and wellness, (2) government, (3) sports & recreation, and (4) organizations. This population was further narrowed to ensure that discussion groups had sufficient critical mass (at least 50 members), were open to public participation, and were not just mailing lists, but active discussion groups (4-5 people posted within the past 90 days). A total of 1304 discussion groups were identified as members of this target population.

Step 2: Select a stratified random sample

Given this population, it is now possible to select a random sample from the frame. A stratified random sampling approach was used to ensure that

Table 7: Stratified Sample within the Sampling Frame

Category	Groups Meeting Criteria	Pop. %
Health & Wellness	435	33%
Government	139	11%
Sports & Recreation	531	41%
Organizations	199	15%
Total	1304	100%

each category was proportionally sampled (Table 1). If a category had additional hierarchical clustering of discussion groups, these were ignored for sampling purposes. All groups meeting the criteria were counted within that group as if there was no categorization below the highest level.

If this survey research is replicated with a non-categorized, but a heterogeneous discussion group population, then an inspection method should be added to categorize the discussion groups to ensure proportional representation in the sample. To attain a 95% confidence level that the sample results are inferable to the sampling frame, 359 discussion groups need to be surveyed. However, knowing the response rate may be less than 50%, over sampling was estimated to compensate for this lack of coverage. For this reason, the sample was adjusted to 371 discussion groups.

To measure non-response rates, the survey captures the name of the discussion group as entered by the respondent and/or the source URL of the discussion group on which the invitation was placed. This will also allow results to be analyzed by category. If one category appears to be proportionally underrepresented in the response rates, additional samples can be pulled in for the under-represented category. The process can be repeated using various discussion group aggregations with this sampling method until researchers decide that a sufficient number of survey responses have been collected for analysis.

Guidelines Application: Distribution Methods and Response Rate Management Decisions

Based on the way the survey is designed and the technology is applied, researchers will be able to estimate the non-response rate at the discussion group level and will be able to calculate the attrition rates at the respondent level by survey section.

The invitation to participate in the research is separate from the survey itself [Witmer et al., 1999; Mehta & Sivadas, 1995; Sheedan, 2001; Cho & LaRose, 1999]. It has been designed to build a trusting relationship from the beginning of the survey experience. A customized invitation will be posted to each group in the sample. Knowing that the majority of responses to electronic invitations occur very shortly after invitation posting, reminders will be posted each week for three weeks following the initial invitation [Yun & Trumb, 2000; Claycomb et al., 2000]. By that time the invitation should have been read by all readers who visit the discussion group at least once a month. The database will be examined before each reminder to determine if a reminder is warranted. If, after three

reminders, few responses from a particular discussion group have been recorded, a decision may be made to select another discussion group for the sample.

Many design features are used to reduce attrition. The survey introduction will use a full disclosure, direct access to researchers, and third party guarantor (IRB) to built trust and credibility in the researchers. Demographic data was gathered at the beginning of the survey [Frick et al., 1999]. A realistic estimate of the time required to complete the survey, a description of the survey structure and indicators of survey progress (using static statements) are provided.

Guidelines Applications: Survey Piloting Decisions

Following Dillman's [2000] four stage piloting process, Stage 1 – initial survey development is complete, as is Stage 2 – cognitive pretesting although a slightly different approach was taken that is discussed by Dillman [2000] and Preece et al [2002]. The researchers constructed draft survey questions using a word processor. One researcher developed the online prototype, which went through two rounds of review with colleagues to ensure question completeness, efficiency, relevancy and format completeness. Stage 2 consisted of several subjects, not involved in the research, who completed the survey under the observation of a researcher using “think out loud” protocols with retrospective interviews. These cognitive pretests resulted in language simplification on the invitation and survey questions, changes in sequencing, and feedback on the look and feel of the survey. After the prototype was updated once more, an invitation to review the survey was placed on the AoIR listserv. Over 50 people completed the survey and 15 people provided email feedback to varying degrees of detail. This pretesting produced an array of technical testing changes to privacy and confidentiality language and requirements, numerous recommendations for question wording, inconsistencies among questions and elimination of several questions.

The survey and the invitation will soon undergo final changes so that a Stage 3 pilot test of the sampling technique with “live” discussion groups can be conducted. The language must encourage non-public participants in discussion groups to participate in the survey without alienating more active discussion group members. The invitation will be posted on approximately 30 discussion groups not included in the sample but included within the MSN online communities' portal. This will allow researchers to monitor for negative reactions to the posting, estimate non-response and attrition rates and test analysis procedures before going to Stage 4 – last format review before the full study is conducted.

Conclusions: Trade-off Decisions are not Eliminated with Survey Guidelines

All the researchers involved in the developed of this web-based survey are seasoned academics and professionals in their representative fields. Yet, despite this, they are continually challenged by the trade-off decision making required at every step of the survey process. Among their chief concerns are sampling frame and sample selections and building a trusting relationship with prospective respondents. Every review uncovers new apparent weaknesses that require still more adjustments in either the survey or the distribution method. It is hoped that from this process, the researchers can not only address the issues of the subject of their research (i.e., further knowledge of lurkers and lurking), but also add to the knowledge about building and using web-based surveys.

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